Heyers Gulch

Timber Sale
Environmental Assessment

February 2014
Montana Department of Natural Resources and Conservation
Trust Lands Management Division
Southwestern Land Office
Missoula Unit

CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name:	Heyers Gulch Timber Sale
Proposed Implementation Date:	June 2014
Proponent:	Montana Department of Natural Resources and Conservation: Trust Land Management Division: Southwestern Land Office, Missoula Unit
Location:	Section 15, 16 and 21: T13N, R17W
County:	Missoula

I. TYPE AND PURPOSE OF ACTION

Proposed Action: Timber Harvest:

The Montana Department of Natural Resources and Conservation (DNRC) proposes to harvest timber on approximately 203 acres within portions of Sections 15, 16, and 21: T13N, R17W, Missoula County; approximately 12 miles east of Missoula, Montana (See attachment A-1 vicinity map). Implementation of the Action Alternative would yield approximately 7,000- 10,500 tons (1-1.5 million board feet) of sawtimber. This would generate revenue for the benefit of the Common School (CS) and Lands Acquired -Public Trusts. The proposed action may be implemented as early as June 2014 and may be completed by 2017. The burning of slash and weed spraying activities may be finished by 2018. These dates are approximate.

Location:

The lands that would be affected are predominantly within the south half of Section 16 (designated by the white line on the Proposed Harvest Map Attachment A-2); except for approximately: 2 acres in the N ½ of Section 16, 5 acres within the SW ¼ Section 15 and 2 acres in Section 21 contiguous to the ¼ corner of S16/ S21). These lands are drained by Heyers Gulch, Saint Lawrence Gulch and un-named tributaries, all tributary to the Blackfoot River.

Need for the Action:

The lands involved in this proposed project are held by the State of Montana in trust for the support of specific beneficiary institutions. These include public schools, state colleges and universities, and other specific state institutions such as the School for the Deaf and Blind (Enabling Act, February 22, 1889; 1972 Montana Constitution, Article X, Section 11). The Board of Land Commissioners and Department of Natural Resources and Conservation (DNRC) are required by law to administer these Trust Lands to produce the largest measure of reasonable and legitimate advantage over the long run for these beneficiary institutions (Section 77-1-202, MCA).

Project Objectives:

In order to meet the goals of the management philosophy adopted through programmatic review of the State Land Forest Management Plan (SLFMP) DNRC, 1996, governed by the Administrative Rules for Forest Management (ARM 33.11.401 through 471), and conservation commitments specified within the Montana Forested State Trust Lands Habitat Conservation Plan (HCP) the Department has set the following specific project objectives:

1. Generate a reasonable and legitimate amount of revenue for the Common School and Lands Acquired -Public Trusts by harvesting approximately 7,000- 10,500 tons (1 -1.5 million board feet) of sawtimber.

2. Salvage Douglas-fir sawtimber that is at high risk of mortality due to *Armillaria ostoyae* (root rot). Salvage and sanitize mature and over mature Douglas-fir stands with *Schweinitzii* (root and butt rot) which is causing both mortality and volume loss (including wind-throw) and predisposes Douglas-fir to Douglas-fir beetle mortality.

3. Restore an Old Growth ponderosa pine stand by harvesting Douglas-fir and maintaining a minimum of 8 ponderosa pine trees per acre (tpa) ≥ 21 inches diameter breast height (dbh). Retain a minimum of 10 tpa ≥ 21" dbh western larch where it occurs.

4. Promote forest health and vigor of timber stands and subsequently help prevent and/or decrease the incidence of insect and disease infestations by encouraging regeneration of ponderosa pine and western larch which are more resistant to *Armillaria ostoyae*.

5. Improve tree growth by promoting younger age classes of preferred seral species (i.e. ponderosa pine and western larch) and regenerate portions of stands (create new age class) of these preferred seral species.

II. PROJECT DEVELOPMENT

1. PUBLIC INVOLVEMENT, AGENCIES, GROUPS OR INDIVIDUALS CONTACTED:
Provide a brief chronology of the scoping and ongoing involvement for this project. List number of individuals contacted, number of responses received, and newspapers in which notices were placed and for how long. Briefly summarize issues received from the public.

Comments from the general public, interest groups and agency specialists (DNRC) were solicited beginning in April, 2012. A Legal Notice was posted in the *Missoulian* newspaper on April 18, 22, 25 and 29. Scoping Notices were sent to 71 individuals and/or organizations (a list of the organizations/individuals contacted is available in the project file). The Scoping Notice was also made available on the DNRC website and distributed internally within the DNRC as well. Scoping Notices were mailed to adjacent landowners and residents along Bear Creek Road, which would be the proposed haul route.

The Tribal Preservation Office of the Confederated Salish and Kootenai Tribes expressed concern about protection of any cultural resources within the project area including culturally modified trees. Several residents along Bear Creek Road and the Department of Public Works, Missoula County expressed concerns about road use issues: i.e. safety, dust, maintenance and repairs. Several individuals expressed concern that continued timber harvest (within affected drainages) could negatively impact forest cover important to elk and deer; and that any mature forest cover existing within the project area is unique and rare.

Issues identified both internally and externally constitute the basis for the formation of project specifications, development of mitigation measures, and assessment of environmental impacts.

The following resource specialists were involved in the project design, assessment of potential impacts, and development of mitigation measures:

- Garrett Schairer - Wildlife Biologist, DNRC, Southwestern Land Office (SWLO)
- Jeff Collins – Soils specialist/ Hydrologist, DNRC, SWLO.
- Patrick Rennie - Archeologist, Agriculture and Grazing Management Bureau (AGMB), DNRC, Helena.
- Jeff Rupkalvis-Decision Maker/ Forest Management Supervisor, Missoula Unit, DNRC.
- Jonathan Hansen-Project Leader/ Unit Manager, Missoula Unit, DNRC.

2. OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED:
Examples: cost-share agreement with U.S. Forest Service, 124 Permit, 3A Authorization, Air Quality Major

Open Burning Permit.

Montana Department of Environmental Quality:
DNRC classified as a major open burner by the Montana Department of Environmental Quality (DEQ), is issued a permit from DEQ to conduct burning activities on state lands managed by DNRC. As a major open-burning permit holder, DNRC would comply with the limitations and conditions of the permit.

Montana/Idaho Airshed Group:
DNRC is a member of the Montana/Idaho Airshed Group, which regulates prescribed burning, including both slash and broadcast burning, related to forest-management activities performed by DNRC. As a member of the Airshed Group, DNRC agrees to only burn on days approved for good smoke dispersion as determined by the Smoke Management Unit in Missoula, Montana.

3. ALTERNATIVE DEVELOPMENT:
Describe alternatives considered and, if applicable, provide brief description of how the alternatives were developed. List alternatives that were considered but eliminated from further analysis and why.

Alternative A: No Action:
Under this alternative no harvest would occur and thus no revenue would be generated for the Common School Trust. No road maintenance would occur nor would any improvements to roads be made within the project area. Current land use within the project area would not change i.e. grazing and non-motorized recreational use would continue.

Alternative B: Action:
Under this alternative timber would be harvested on approximately 203 acres. The harvest would take place almost entirely within the south half of Section 16 (see Proposed Harvest map Attachment A-2). The white east to west line on the map approximates the division of Section 16. The primary proposed harvest treatment would salvage Douglas-fir sawtimber affected by root rots and Douglas-fir beetle. Restoration harvest treatment would occur within ponderosa pine stands including 25 acres estimated to be Old Growth (as defined by Green et al. 1992), where a minimum of 8 ponderosa pine trees ≥ 21" diameter breast height would be retained per acre. The majority of western larch would be retained including 10-17 large diameter (≥ 21" dbh) trees per acre (tpa) where they occur in groups approximately 2 acres total throughout proposed harvest areas. No harvest would occur within Streamside Management Zones (SMZs).

Approximately 4 miles of new road would be constructed to access harvest areas. The proposed haul route is approximately 12.5 miles of existing road. The first 2.7 miles (approximately) of Bear Creek Road is maintained by Missoula County. The remainder of the existing road used for access (approximately 9.8 miles) would be maintained and improved by DNRC. The proposed haul route was sprayed for weeds in June of 2013, follow-up treatments are planned post-harvest. Grazing and non-motorized recreational use would continue. Motorized access would continue to be restricted on DNRC lands within T13N, R17W.

III. IMPACTS ON THE PHYSICAL ENVIRONMENT

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:
Consider the presence of fragile, compactable or unstable soils. Identify unusual geologic features. Specify any special reclamation considerations. Identify direct, indirect, and cumulative effects to soils.

There is a concern that forest management activities may result in increased erosion and reduced soil productivity where excessive disturbance from compaction, displacement, or loss of nutrients occurs, depending on the extent and degree of harvest related soil effects.

No Action Alternative: Direct, Indirect, and Cumulative Effects
Implementation of the No-Action Alternative would result in no soil resource impacts in the project area. Soil resource conditions would remain similar to those described in the existing conditions of this analysis.

Action Alternative: Direct and Indirect Effects on Soils
Implementation of the Action Alternative would result in a combination of salvage harvest of dead, dying and high-risk trees and regeneration harvest to reduce competition and improve growth of diverse tree species that are more resistant to root rot. Approximately 203 acres of harvest are proposed on locations outlined on Soil Maps S-1. Tree planting, grass seeding roads and noxious weed management would also occur. The proposed project could construct approximately 4 miles of new road and complete repairs and maintenance on up to 12.5 miles of road to meet BMP's.

Primary soil concerns with harvest operations are the potential for excessive surface disturbance and to a lesser degree, erosion. To maintain soil productivity, and promote conifer regeneration, Best Management Practices (BMP's) and the listed mitigation measures would be implemented to minimize the area and degree of soil effects associated with harvest operations. Implementation of BMP's and the recommended mitigation measures, has been shown to effectively limit detrimental soil impacts to less than 15% of the harvest units based on DNRC soil monitoring on comparable sites (DNRC 2006, 2011) and recent harvest on nearby sites and the estimated area that may be detrimentally impacted is displayed in table S-2.

All new roads would be located on stable terrain and constructed to meet Best Management Practices. The ≈ 4 miles of new road construction would change the land use of the added roads to transportation on 13.2 acres of land as noted in table S-2. The actual area disturbed varies with road width and extent of temporary roads that would be reclaimed. Proposed roads cross segments of shallow soils and fractured bedrock, and expected rock raveling would require periodic maintenance. The high rock/coarse fragment soils are excessively well drained and durable to road traffic with implementation of standard road drainage features. On existing roads, road maintenance and site specific road reconstruction requirements would be implemented to improve road drainage and control erosion. All new roads would be grass seeded with site adapted grass to speed revegetation and control erosion and weeds.

Cumulative Effects of the Action Alternative on Soil productivity
Cumulative effects to soils can occur from repeated ground skidding entries into a harvest area and additional road construction, depending on the area included. No previous harvest occurred in section 16 and only minor effects occur on proposed harvest areas in sections 15 and 21, thus there is low potential for additive cumulative effects to soils with the proposed actions.

Cumulatively over the rotation of the forest stands, the combination of fine litter and coarse woody debris would be expected to maintain surface organic matter that provides media for healthy soil fungi and conserves soil nutrients and moisture important to tree growth and supports long term productivity. Improved tree spacing will reduce competition for nutrients and soil moisture, enhance growth of retained trees, and promote regeneration of conifers as noted in the vegetation section.

For a complete Geology and Soils analysis see: <u>Attachment B:</u> Soils and Noxious Weeds Analysis Report.

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5. WATER QUALITY, QUANTITY AND DISTRIBUTION:
Identify important surface or groundwater resources. Consider the potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality. Identify direct, indirect, and cumulative effects to water resources.

There is a concern that the proposed action may cause impacts to water quality and quantity from timber management, road construction and road use.

There is a concern that the proposed timber harvest may cause or contribute to cumulative watershed impacts as a result of potential increased runoff and sedimentation.

No Action Alternative: Direct, Indirect, and Cumulative Effects

Implementation of the No-Action Alternative would result in no water resource impacts in the project area. Water quality would remain similar to that described in the existing conditions sections of this Environmental Assessment.

Action Alternative: Direct, Indirect, and Cumulative Effects

Implementation of the Action Alternative would be a combination of salvage harvest of dead, dying and high-risk trees to reduce competition, promote regeneration of diverse conifer species more tolerant of root rot and improve tree growth. Approximately 203 acres would be harvested using a combination of 123 acres of cable logging and 80 acres of ground based skidding. Approximately 4 miles of new road would be constructed and 12.5 miles of existing road would be maintained and improved to meet BMP's and control sedimentation.

Sediments

As noted in the soils resource analysis, there is a low potential for off-site erosion from the harvest areas based on the high rock content soils, rapid water infiltration rates that exceed most runoff and use of cable harvest practices on steeper sideslopes that would limit disturbance. No harvest would occur within the riparian areas of Heyers Gulch or St. Lawrence Creek in order to maintain effective buffers to any potential sediment. A Streamside Management Zone would be marked and maintained along a short, Class 3 stream segment near the ridge of the St. Lawrence drainage. This intermittent channel has very short duration flow in the spring and does not appear to have connectivity downslope, but would be protected as an added precaution, and no harvest is proposed in the SMZ.

All of the proposed roads would be located on dry stable sites and constructed to meet BMP's on dry sites with one ephemeral draw crossing. The high rock/coarse fragment soils are excessively well drained and durable to road traffic with implementation of standard road drainage features. No new stream crossings are proposed. All new roads would be grass seeded with site adapted grass to speed revegetation and control erosion and weeds.

On the existing haul roads, about 12.5 miles of road maintenance and site specific road reconstruction requirements would be implemented to improve road drainage and control erosion. Road grading would have a short term increase in dispersed road surface erosion that would decline the second year by 70 to 80%.The only operations in the Bear Creek drainage would be use and maintenance of the haul road. On the haul route, road surface drainage improvements and additional rock armor and sediment control at crossings would reduce current sediments on two perennial stream crossings and intermittent stream crossings in the Heyers Gulch drainage. No drainage crossing would be used in St. Lawrence Creek drainage. Overall there would be reductions in site specific sediment sources, with short duration direct effect of low sediments from road repairs and an overall low to moderate risk direct and in-direct downstream effects on water quality in these resilient streams.

Water Yield

Heyers Gulch is 2640 acres in size and has moderate precipitation with an average of 24"/year; water infiltration is rapid in these rocky and well drained soils. The combination of root diseases and insect mortality are leading to declining forest cover and vigor as noted in the vegetation analysis, and the reduced canopy would be expected to increase runoff. The proposed harvest in Heyers Gulch is 116 acres of salvage and regeneration harvest where 50% mortality is expected and the potential increase of water yield would be less than 1%, and not measurable and very unlikely to have a perceptible effect on stream channel stability or channel forms in Heyers Gulch .

St Lawrence Creek is 917 acres in size and has moderate precipitation with an average of 27"/year; water infiltration is rapid in these rocky and well drained soils. The proposed harvest in St. Lawrence Creek is 64 acres of salvage and regeneration harvest where 30% or greater mortality is expected from the combination of root rots and insects. The potential increase of water yield would be less than 1% and not measurable and very unlikely to be perceptible on the ephemeral channel below the harvest area or further downslope to the stream

channel stability or channel forms in St. Lawrence Creek. For all these reasons, there would be low risk of direct and indirect effects to water quantity and water resources as a result of the proposed action.

Cumulative effects
There is low risk of additive cumulative effect to water quality or water yield for the proposed alternative based on no riparian harvest in Heyers Gulch, repair and stabilization of sediment sources, minor estimated water yield increases, stable parent material of high rock contents, and stable, resilient stream channel morphology.
In both Heyers Gulch and St. Lawrence Creek, over time the expected improved growth of retained trees and regeneration of more disease tolerant trees should improve stand cover and vigor and moderate any water yield effects.

For a complete Water analysis see Attachment C: Water and Fisheries Analysis Report.

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6. AIR QUALITY:

What pollutants or particulate would be produced (i.e. particulate matter from road use or harvesting, slash pile burning, prescribed burning, etc)? Identify the Airshed and Impact Zone (if any) according to the Montana/Idaho Airshed Group. Identify direct, indirect, and cumulative effects to air quality.

The DNRC is a member of the Montana/Idaho Airshed Group which was formed to minimize or prevent smoke impacts while using fire to accomplish land management objectives and/or fuel hazard reduction (Montana/Idaho Airshed Group 2006). The project area is within Airshed 3A Impact Zone M (Missoula), Missoula County.

Alternative A: No Action
Under No Action: air quality would not be affected. No logging slash would be generated nor would any truck traffic normally associated with timber sale activities occur. Thus, no pollutants or particulate matter including dust would be produced.

Alternative B: Action

Smoke: The proposed action would include the burning of slash generated from clearing along existing and newly constructed roads and a portion of logging slash generated that would be piled at log landings and subsequently burned. Adequate amounts of slash would be retained in harvest units to facilitate nutrient cycling and would not be burned. Smoke produced from slash burning could result in a minor temporary impact to localized air quality. Over 70% of emissions emitted from prescribed burning are less than 2.5 microns (National Ambient Air Quality PM 2.5). High, short term levels of PM 2.5 or smaller airborne particulates may be hazardous. Within the typical column of biomass burning, the chemical toxins are: Formaldehyde, Acrolein, Acetaldehyde, 1,4 Butadiene and Polycyclic Organic Matter.

Burning within the project area would be short in duration and would be conducted when conditions favored good to excellent ventilation and smoke dispersion as determined by the Montana Department of Environmental Quality and the Montana/Idaho Airshed Group. The DNRC, as a member of the Montana/Idaho Airshed Group, would burn only on approved days. Thus, direct and indirect effects to air quality due to slash pile burning associated with the proposed action would be minimal.

Dust: The transportation of forest products may create dust that could impact air quality. The residential area affected is along the unpaved portion of Bear Creek Road. Missoula County has performed dust abatement on the majority of the unpaved portion of Bear Creek Road in Section 17, T13N, R16W for several years. The County ends dust abatement at the 2.4 mile mark which is approximately 1/10 mile beyond its junction with the West Fork of Bear Creek Road. The DNRC would require (Contract Stipulation) that watering or dust abatement be performed on the remainder of the haul route in Section 17 when road surfaces are dry and traffic would cause road surface materials to become air-borne. The Timber Sale Contract period would be three years. Transportation of forest products (hauling), road maintenance, re-construction of road segments and construction activities would be on-going within this three year period. It is estimated that approximately 260-390 loads of logs would be hauled within the three year period. The majority of hauling would likely occur during the last two years of the Contract period. Final road maintenance activities would occur after hauling is

completed. Whereas traffic could be highly variable, potential impacts resulting from increased traffic would occur for a relatively short duration. Additionally, dust abatement performed by both Missoula County and the DNRC on the unpaved portion of Bear Creek Road would minimize dust dispersal within local residential areas.

Thus, direct and indirect effects to air quality resulting from dust due to increased traffic including hauling of forest products are expected to be minimal and relatively short in duration; therefore, there is low risk of direct, indirect or cumulative effects to air quality.

Cumulative effects of the Action Alternative on Air Quality: The Montana/Idaho Airshed Group regulates burning so that the cumulative effects of smoke do not adversely affect the Human Environment. Smoke generated from burning that may occur on other lands in combination with smoke generated by the proposed action on DNRC lands could potentially increase cumulative effects to local airsheds. The United States Forest Service, Bureau of Land Management, The Nature Conservancy, Corporate Industrial Forest Landowners (e.g. Plum Creek Timber Inc. and Stimson Lumber Co.) and DNRC are all cooperators that operate within the airshed, regulated by the Montana/ Idaho Airshed Group. Non-industrial timberland operators are regulated by the Montana Department of Environmental Quality (DEQ). Unless otherwise approved by the DEQ, the burning season is March 1- November 30 provided burning is not restricted by the State Forester due to risk of wildfire. Burning is only allowed during favorable weather and atmospheric conditions that provide for good ventilation and smoke dispersion. Thus, cumulative effects to air quality from smoke generated from burning slash piles generated from timber sale activities associated with the proposed action would be expected to be low risk and or within acceptable limits.

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7. VEGETATION COVER, QUANTITY AND QUALITY:

What changes would the action cause to vegetative communities? Consider rare plants or cover types that would be affected. Identify direct, indirect, and cumulative effects to vegetation.

There is concern that timber harvest activities may affect forest cover: including types and their distributions. Harvest of large diameter trees may negatively impact Old Growth Stands (as defined by Green et. al. 1992 and adopted in ARM).

Analysis Areas: The project area consists of Section 16 (approximately (≈) 639.5 net acres) and areas that would be affected by harvest within Sections 15 (≈ 4 acres) and 21 (≈ 2 acres), all in T13N, R17W. The area that would be affected by harvest in Section 16 would occur almost entirely (≥ 99%) within the S ½ of Section 16.

Existing Conditions of Forested areas:

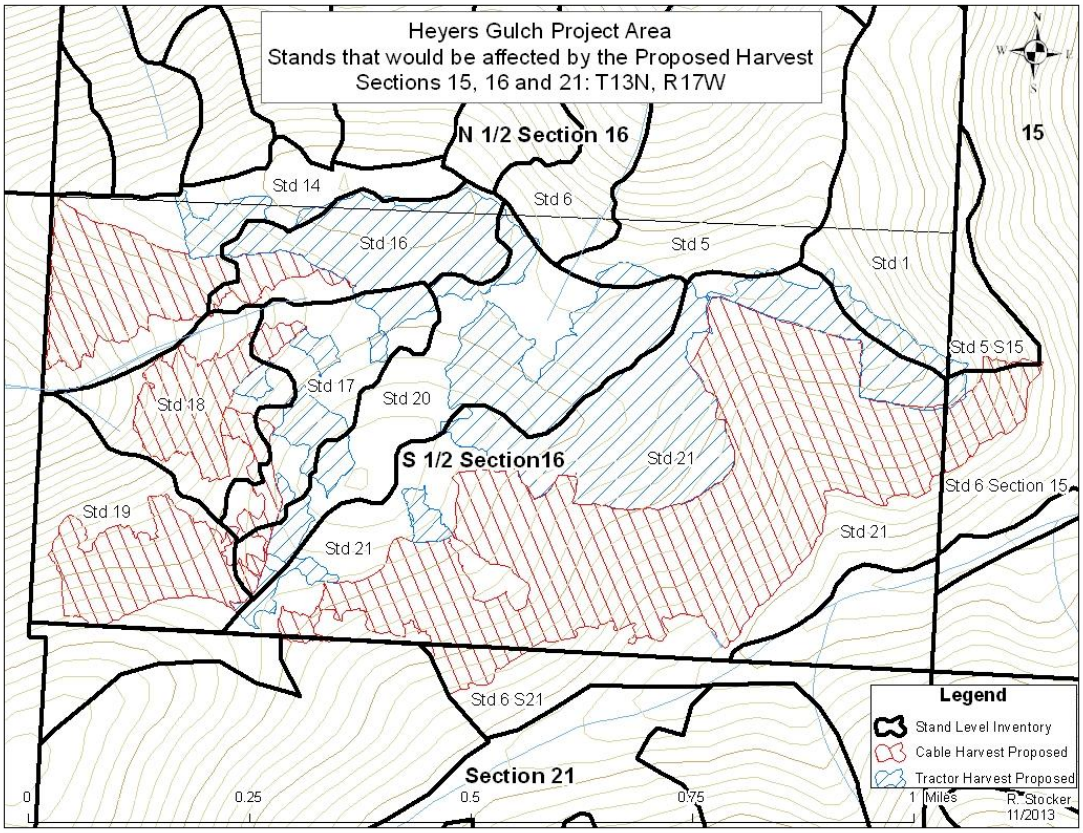
Harvest History:

Prior to December 2010, DNRCs ownership within T13N, R17W consisted of Section 16 and the NE1/4 of Section 24 (see Attachment A-3). Prior to the Potomac Acquisition, and as late as 2010, extensive timber harvest occurred within this Township (including sections 15 & 21) on forest lands contiguous to the project area.

Within Section 16 (SESE ¼) the DNRC approved the construction of a road (approximately ½ mile in length) and a bridge across Heyers Gulch decades ago. This provided access for timber harvest on corporate forested lands previously owned within Section 15.

Attachment A-3 shows current DNRC ownership within T13N, R17W.

Stand ID Map:



Insect and Disease:

Armillaria ostoyae root rot is ubiquitous throughout the Heyers Gulch drainage. Many live trees have symptoms of infection by *Armillaria* root disease, including thinning crowns and basal resinosis, and/or symptoms of infection by *Schweinitzii* root and butt rot (caused by *Phaeolus schweinitzii*), including rounded crowns and brown cubical decay in the broken stems. Larger Douglas-fir trees infected by either of these root disease agents become more susceptible to attack by Douglas-fir beetle (Lockman 2013). *Armillaria ostoyae* is the cause of on-going mortality (and substantial volume loss) predominantly of Douglas-fir (which is highly susceptible), although other more shade tolerant species (e.g. subalpine fir) are also susceptible. *A. ostoyae* spreads via root to root contact and short distance growth of the fungus through the soil (Hagle et al. 2003). Tree vigor, genetic resistance, environmental stresses, disturbance and the effects of other insect or disease pathogens determine a trees response to A. ostoyae infection. Whereas western larch and ponderosa pine are resistant they may not be completely immune to *Armillaria ostoyae*. Following a disturbance e.g. fire or logging, residual trees would be more vulnerable to increased inoculums levels for 2-3 decades (Hagle et al. 2003).

Phaeolus schweinitizii root and butt rot (decay) is also common, predominantly within Douglas-fir, throughout the project area. It does not spread via root to root contact, however when present in the

root zone it can infect and rot tree roots and the butts of mature and over mature trees. It is very common in old stands. As the trees lose root mass, they are prone to wind-throw. Additionally because *P. schweinitzii* often causes substantial butt decay (often lowest 8' of bole with heart wood decay) old Douglas-fir are prone to break at this point of decay. *Phaeolus schweintzii* as it weakens trees, predisposes them to *Armillaria ostoyae* and Douglas-fir beetle attack. Trees affected by Douglas-fir beetle are more prone to the effects of *Armillaria ostoyae*. Wind-thrown trees (including trees that beak-off) attract Douglas-fir beetles which use them as brood trees.

Fomitopsis officinalis and ***Phellinius pini*** are also present within the project area, they both cause stem decay in western larch and Douglas-fir. *F. officinalis* causes stem decay in ponderosa pine. Both can cause substantial volume loss especially in old stands.

Douglas-fir beetle (*Dendroctonus pseudotsugae Hopkins*) has also caused much volume loss within the proposed harvest area over the last decade. Although populations have declined to endemic levels, recent isolated attacks have been observed for the past several years. Over-stocked stands of mature and over mature Douglas-fir would remain at risk to the synergistic effects of root rot pathogens and beetles.

Mountain pine beetle has caused mortality in both lodgepole pine and ponderosa pine. The epidemic peaked in 2008, currently populations are endemic.

Douglas-fir mistletoe (*Arceuthobium douglasii*, a parasite) is present in some portions of the project area. It causes "witches brooms" in the limbs and can cause deformities in the boles causing poor wood quality and breakage. As it grows, it takes water and nutrients away from its host tree, which slows tree growth and weakens the tree. Mistletoe can predispose trees to insect attack and other pathogens. On poor sites and especially under droughty conditions it can lead to mortality when the entire crown becomes severely infected (Hagle et al. 2003). Douglas-fir mistletoe is found most notably on the east and southern aspects within Heyers Gulch in the SE ¼ and SENE ¼ of Section 16, and within the NESW 1/4 of Section 15. Generally infections are light to moderate and not wide spread, although some severe infections are found within SLI stand 1(east aspect) and the ridge top location where SLI stand 1, 5 and 21 boundaries intersect there is a patch ≤ 1 acre where Douglas-fir mortality is ongoing and imminent.

Multi-storied stands with Douglas-fir are vulnerable to **western spruce budworm** infestation. It is a defoliator and can cause damage in Douglas-fir, true firs, spruce and western larch. Larvae mine buds and foliage. Heavy defoliation can result in cone and seed destruction, top kill and mortality, often exacerbated by conditions that stress trees (e.g. drought).

Forest Cover Types:

The Stand Level Inventory Model describes an Appropriate Cover Type Condition synonymous with the Desired Future Condition (DFC) (ARM 36.11.405). The data source for the following tables is the DNRC Stand Level Inventory (SLI) 11-12-2013.

Table 7-1 shows Current Cover Types (gross acres) for Section 16 compared to the DFC. It also illustrates that the predicted Cover Type shift which would occur as a result of the proposed harvest is negligible.

Table 7-1: Section 16 Current Cover Type Condition, post-harvest effect and Desired Future Condition

COVER TYPE	Currently		Post-Harvest		DFC	
	Acres	Percent	Acres	Percent	Acres	Percent
Douglas-fir	81	13	81	13	61	9
Western larch/Douglas-fir	252	39	250	39	177	28
Mixed Conifer	61	9	61	9	0	0
Ponderosa pine	248	39	250	39	354	55
Lodgepole pine	0	0	0	0	50	8

TOTAL	642	100%	642	100%	642	100%

Table 7-2 shows that within Section 16 there are approximately 247 acres (gross) where the cover type condition currently is different than the DFC.

Table 7-2: Section 16 Cover type condition where Current Cover is not equal to DFC

Cover type	Current cover acres	DFC acres	Difference acres
Douglas-fir	81	61	+20
Mixed conifer	61	0	+61
Ponderosa pine	30	136	-106
Western larch/ Douglas-fir	75		+75
Lodgepole pine	0	50	-50
Total	247	247	247

At the project level, there are limited opportunities to help trend stands toward the DFC through potential cover type shifts largely as the result of the decision not to harvest stands on generally north aspects facing the Blackfoot River. This area accounts for approximately 142 acres of the total 247 acres currently in an inappropriate cover type condition (57% of the area). A portion of the remaining 56 acres within the Heyers Gulch drainage which is currently in an inappropriate cover type is inaccessible due to the decision not to repair or replace the bridge across Heyers Gulch. There is an 11 acre stand 22 in the SESE of Section 16 in an inappropriate cover type condition (mixed conifer now, appropriately Douglas-fir). The remainder consists of two stands (Stands16 and 17) totaling 39 acres that are not currently in an appropriate cover type condition (refer to Table 7-3). Stand 16 (approximately 20 acres) currently is a ponderosa pine cover type and the other a western larch/ Douglas-fir cover type (Std 17, approximately 19 acres). Both stands are modeled appropriately as a Douglas-fir cover type, however, both stands are infected with *Armillaria ostoyae* root rot and Douglas fir is much more susceptible to *Armillaria* root rot than ponderosa pine and western larch. While Douglas-fir would likely persist in both these stands, ongoing mortality and volume loss would continue. Promoting more disease resistant species and increasing stand diversity should make these stands more productive and would increase the likelihood of these stands to contain mature forest coverage of western larch and ponderosa pine which are more fire resistant, more resistant to *A. ostoyae* and longer-lived than Douglas-fir. Thus, for silvicultural reasons harvest would retain ponderosa pine and western larch within these Douglas-fir stands and where these species occur.

Table 7-3 shows that 29.19 acres (14%, 29/203 acres) of the area potentially affected by harvest is in an inappropriate cover type condition, and that harvest would affect 87% of area of Stand 16 and 43% of the area of Stand 17. Harvest within Std. 1(S.16) and Std.5 (S. 15) would likely shift coverage towards the DFC.

Table 7-3: Cover types potentially affected by harvest where Current Cover Type is not equal to the DFC.

Section (S.)	Stand (Std.)	Acres (net)	Affected acres (net)	% Stand Affected	Current Cover Type	DFC
16	16	19.7	17.17	87.1 %	Ponderosa pine	Douglas-fir
16	17	19.2	8.29	43.2 %	Western larch/ Douglas-fir	Douglas-fir
16	1	34.8	2.28	6.5 %	Western larch/ Douglas-fir	Ponderosa pine
16	5	50.1	0.95	1.9 %	Mixed conifer	Lodgepole pine
15	5	7.5	0.50	6.6%	Douglas-fir	Western larch/ Douglas-fir
Total:			29.19	approximately 14 % of total Harvest area		

Most notably **Table 7-4** illustrates that there are currently insufficient acres when compared to the DFC of both ponderosa pine and western larch/ Douglas-fir cover types on Missoula Unit.

Table 7-4: Missoula Unit Cover type condition where Current cover is not equal to DFC

Cover type	Current cover net acres	DFC net acres	Excess net acres	Shortage net acres
Douglas-fir	6,458	1,058	+5,400	
Ponderosa pine	2,020	14,192		-12,172
Western larch/ Douglas-fir	4,865	9,291		-4,425
Mixed conifer	5,041	360	+4,681	
Lodgepole pine	1,348	923	+425	
Subalpine fir	2,816	0	+2,816	
Non-stocked	3,868	0	+3,868	
Western white pine	37	798		-760

Fire:

Effects of Fire Exclusion:
Effective fire suppression has led to the establishment of dense regeneration, with a higher proportion of the more shade tolerant species such as Douglas-fir and subalpine fir present within the project area. With the absence of fire, forests can become overstocked and stagnated. Fuel accumulations increase as trees die from competition and environmental stresses. Overstocking and the associated stress due to competition between trees for moisture and nutrients can lead to increased attack by insects such as the mountain pine beetle, pine engraver beetle and Douglas-fir beetle. The development of an understory of Douglas-fir and or subalpine fir forms a very effective fuel ladder that enables a surface fire to climb into the crowns of the larger overstory trees and kill them. High fuel loadings and dense stand conditions have led to high intensity, stand replacing wildfire in stands where they were uncommon in the past (Arno and Brown 1991). In many stands were Douglas-fir is the potential climax tree, dense understories of this species have developed, making a ladder of fuels that now endangers even the fire-resistant, old-growth overstory of ponderosa pine, Douglas-fir, and western larch (Arno 1976).

Forest Habitat Types (as defined by Pfister et al. 1977): The proposed harvest would affect Habitat Types grouped as: Douglas-fir climax series 85 ½ % and subalpine fir climax series 14 ½ % (of the area affected).

Fire Groups (as defined by Fischer and Bradley 1987): Forest Habitat Types are assigned to Fire Groups based primarily on fire's role in forest succession; the response of tree species to fire and the roles these tree species take during successional stages (Fischer and Bradley 1987). Table 7-5 shows the Fire Groups of the area that would be affected by harvest based on Habitat Type assignments specified by Fischer and Bradley 1987.

Table 7-5: Fire Groups of the affected harvest area

	% area affected by harvest
Fire Group 4: warm, dry Douglas-fir Habitat Types	22.5%
Fire Group 6: moist Douglas-fir Habitat Types	63.0%
Fire Group 9: moist, lower subalpine fir Habitat Types	14.5%
Total	100.0%

Role of naturally occurring fire:

Douglas-fir climax series:

Fire Group 4: Frequent fires in seral stands maintained a ponderosa pine "fire climax" condition by killing fire-susceptible Douglas-fir seedlings (Fischer and Bradley 1987).

Fire Group 6: Frequent low or moderate fires favored larch and ponderosa pine over Douglas-fir in stands where these species occurred. A fire-maintained open forest condition was the normal situation during the presettlement period. Climax Douglas-fir stands are rare because of the presence of seral species whose longevity is greater than the usual fire-free interval (Fischer and Bradley 1987).

Subalpine fir climax series:

Fire Group 9: Infrequent fire: mostly low severity or stand replacing. Fire History information is limited for moist site Fire Group 9 sites. Available evidence indicates that fires on such sites are infrequent and are mostly low severity or stand-replacing. A moderate or severe fire could remove much of the Douglas-fir, leaving the site to be regenerated by either serotinous lodgepole pine or remnant larch (Fischer and Bradley 1987).

Structure: All areas that would be harvested are multi-storied structures. All stands within Section 16 are multi-storied structures. Whereas SLI stand 6 in Section 21 is classified as a two storied stand, the proposed harvest area (approximately 2 acres) could be classified as multi-storied.

Age Class: Within Section 16 all but 95 acres (which are classed 100-149 years old) are classed as Old ≥ 150 years old. Approximately 96% of the proposed harvest area is currently classed as Old (≥ 150 years old).

Age Class Distributions:
Losensky's report: "Historical Vegetation of Montana" 1997, summarized United States Forest Service (USFS) inventory data dating back to the 1930's. From this data some extrapolations were made so as to quantify historic forest conditions by back dating to 1900, which generally would reflect stand conditions at the time of Euro-American arrival in Montana (Losensky 1997).

Table 7-6a: Historic***** (Losensky 1997) and Current Age Class distributions (SLI 11-12-2013):

Analysis Areas:	Percent of Area by Age Class Groups			
	0-39	40-99	100-149	150+
Missoula Unit Historic*****	35%	24%	18%	23%
Missoula Unit Current	18%	28%	35%	19%
Heyers Gulch Section 16 Current	0%	0%	15%	85%
Heyers Gulch proposed harvest area Current	0%	0%	4%	96%

*Historic Age Class Distributions: Because the Missoula Unit occupies two Climatic Sections, a weighted average of the Historic Age Class distributions for Climatic Sections M333D and M332B (as reported by Losensky, B.J. 1997) was calculated to determine the Historic Age Class distribution for the Missoula Unit (Spoelma, T., DNRC: Memorandum to Deer Creek Timber Sale Project and EA 2010). 65% of Missoula Unit's net Forested area is within Climatic Section M332B and 35% is within M333D.

Old Growth: Old stands were stratified and sampled (2011) using SLI Protocols to determine the potential of Old Growth (as defined by Green et al. 1992). As per SLI protocols, assignments are made to determine minimum Green et al. criteria (Old Growth Type Class) for each stand based on Habitat Type (Forest Habitat Types of Montana, Pfister et al.) and Current Cover Type. For the Habitat Types and Cover Types (ponderosa pine and western larch/ Douglas-fir) within proposed harvest areas, there are two Old Growth Types (as defined by Green et al. 1992) with the following criteria:

1. 8 tpa ≥ 21" dbh ≥ 170 years: for ponderosa pine cover type/ Habitat Type Group.

2. 10 tpa ≥ 21" dbh ≥ 180 years: for western larch/ Douglas-fir cover type/ Habitat Type Group.

Within the NESE ¼ of Section 16 (a portion of SLI Stand 21) is an area of Old ponderosa pine. Field surveys conducted in 2011 estimated that this area is probably Old Growth as defined by Green et al. 1992. The area is approximately 25 acres in size.

Losensky estimated a distribution of Old stands ≥170 years, by Climatic Section for the cover types shown in Table 7-6b. Table 7-6b shows most notably that there is less than a third of Old ponderosa pine and roughly five times as much Old Douglas-fir on Missoula unit currently than Losensky estimated.

Table 7-6b: Historic Age Class: Old stands by Climatic Section and Cover Type. Reported by Losensky 1997					Missoula Unit Old ≥ 150 years current SLI 11-12-2013
M332B Bitterroot/Blackfoot		M333D Pend Oreille/ St. Joe		***Weighted average: Missoula Unit Historic age class distribution*	
Cover Type	Old≥170 years	Cover Type	Old≥170 years	Old≥170 years	
PP	59%	PP	49%	55.30%	17.3%
WL/DF	44%	WL/DF	20%	35.12%	30.0%
DF	5%	DF	7%	5.74%	26.5%

On Missoula Unit, past selection harvest of Old ponderosa pine has likely contributed to reduction of Old ponderosa pine below what Losensky estimated to be the pre-settlement age class distribution. To a lesser extent, fire exclusion may have resulted in a declining presence of fire dependant old ponderosa pine in stands with an increasing coverage of Douglas-fir. On Missoula Unit, past selection harvest and effective fire suppression has resulted in decreased coverage of fire dependant western larch within western larch/ Douglas-fir cover types, so that currently there is more Old Douglas-fir than Losensky reported.

Environmental Consequences:

Alternative A; No Action: (Direct and Indirect Effects):

Timber stands within the project area would remain much as they are now with Douglas-fir dominating most sites with slow growth, continuing mortality and timber volume loss as the result of root and butt rots, and Douglas-fir beetle. Canopy cover afforded by predominantly Old Douglas-fir sawtimber over time would continually decrease. As overstory trees die, intermediate pole size trees and overtopped seedlings and saplings within multi-storied structures would slowly increase growth. Eventually, the most vigorous free to grow trees would establish dominance, forming a new upper canopy layer which would gradually increase in crown density. As they increase in size and compete for light, water and nutrients, the least vigorous trees, least resistant to *Armillaria ostoyae* would die or be killed by Douglas-fir beetle. Within over-stocked ponderosa pine stands, mountain pine beetle could cause continued mortality which could prevent maturation of ponderosa pine and development of some Old growth characteristics e.g. large diameter old trees. Within 25 acres of a ponderosa pine stand estimated to be Old Growth, restoration treatments would not take place i.e. increasing the presence of Douglas-fir including ladder fuels would not be reduced thus perpetuating the risk of severe fire effects. It is possible that the spread of *Armillaria ostoyae* root rot into this stand would eventually reduce Douglas-fir coverage. In the absence of disturbance (e.g. fire, harvest), and without management, Douglas-fir and subalpine fir could increase their presence in areas not affected by *Armillaria ostoyae* root rot over time replacing shade intolerant species such as ponderosa pine and western larch. Within Douglas-fir and western larch/ Douglas-fir cover types affected by *Armillaria ostoyae* it is possible that shade intolerant species e.g. ponderosa pine and western larch could increase, at least relatively corresponding to the loss of Douglas-fir. Although it could also be expected that within portions of these stands with Douglas-fir seedlings and saplings, that Douglas-fir would continue to dominate these sites inhibiting seral regeneration, especially in the absence of fire. In many stands were Douglas-fir is the potential climax tree, dense understories of this species have developed, making a ladder of fuels that now endangers even the fire-resistant, old-growth overstory of ponderosa pine, Douglas-fir, and western larch (Arno 1976). *Armillaria ostoyae* would continue to cause mortality of Douglas-fir resulting in continued volume loss. To a lesser extent, Doulas-fir sawtimber infected with *Phaeolus schweinitzii* root and butt rot would suffer decreased vigor and its effects on growth, continuing volume loss via butt rot, be predisposed to wind-throw and continued Douglas-fir beetle mortality resulting in continued volume

loss. The combined effects of all three pathogens (*A. ostoyae, P. schweinitzii* and Douglas-fir beetle) on Douglas-fir sawtimber would continue.

Alternative B: Action: (Harvest: Direct and Indirect Effects):

Harvest would occur on approximately 203 acres. Approximately 96% of the proposed harvest would occur within the S ½ of Section 16. No harvest would occur within SMZs. The harvest would salvage Douglas-fir sawtimber at high risk to mortality (and loss of volume) due to the combined effects of *Armillaria ostoyae*, Douglas-fir beetle and *Phaeolus schweinitzii*. Consequently, the vast majority of Douglas-fir sawtimber would be harvested. It is estimated that Douglas-fir sawtimber would comprise 90-93 % of the gross volume from 80-82% of the total number of sawtimber trees available within proposed harvest areas. Additionally, approximately 60% of the total gross sawtimber volume would be harvested from within proposed harvest areas. Within harvest areas, a minimum of 1 snag and 1 snag recruit per acre would be retained. Some oversize large diameter Douglas-fir ≥ 33" dbh with evidence of rot and or poor wood quality, with large diameter limbs would be retained. Trees with evidence of extensive rot ≥ 65%, especially large diameter trees with rotten scars, broken boles, conks and cavities would be retained.

The proposed harvest would retain the majority of western larch and ponderosa pine. Within ponderosa pine stands (or areas with ponderosa pine coverage) a minimum of 8 ponderosa pine tpa ≥ 21" dbh would be retained where available. Within portions of western larch/ Douglas-fir stands a minimum of 10 to 17 tpa of western larch would be retained where available. The proposed harvest would retain dominant high quality seed trees with best available crowns, well formed, and well developed. Retention trees (except snag recruits with bole rot) would be free of insect and disease, exhibiting better than poor vigor. Immature ponderosa pine and western larch would be crown-thinned and mature large diameter ponderosa pine and western larch trees would be thinned from below retaining the best dominant trees. Retention trees would be retained in groups or as individuals in a non-uniform spatial arrangement. It is estimated that post-harvest ≥ 95% of all western larch present would be retained and that approximately 2 acres of available large diameter western larch coverage would be maintained with retention of 10-17 western larch tpa ≥ 21" dbh. It is estimated that the majority (4/5) of large diameter (≥ 21" dbh) ponderosa pine would be retained.

Within the NESE ¼ (a portion of SLI Stand 21 and the southern tenth of Stand 1) exists an area approximately 25 acres that is estimated to be Old Growth. This area of Old Growth would receive a restoration type treatment: harvesting Douglas-fir and retaining a minimum of 8 tpa ≥ 21" dbh of ponderosa pine. Harvest within another ponderosa pine (stand No.14) would be treated similarly retaining ponderosa pine ≥ 21" dbh (up to 8 tpa), although Old Growth surveys conducted in 2012 did not find sufficient large diameter Old trees to classify it as Old Growth at that time. Within a western larch/ Douglas-fir (stand No. 20) exists an area of approximately 1 1/2 acres where there are Old large diameter western larch trees. Harvest within this area would retain 10-17 western larch tpa ≥ 21" dbh. There are large diameter western larch trees scattered though out other portions of this stand (20; and other stands 17, 19 and 21) that would be retained as well.

Insects and Disease: The salvage of ponderosa pine attacked by mountain pine beetle and stocking reduction would make residual stands more resilient to any future beetle outbreaks. Mountain pine beetle has killed the vast majority of merchantable lodgepole pine within Section 16 and populations are endemic. Widely scattered individual lodgepole pine trees and an approximately 1 acre patch of lodgepole pine exist within proposed harvest areas, most of which are dead. Any new attacks would be salvaged along with any salvageable dead lodgepole pine. Timely removal of brood trees would prevent beetles from continuing their life cycle. Harvest would remove over story Douglas-fir infected with mistletoe, thus inhibiting the further spread of this pathogen. Understory Douglas-fir, sub-merchantable poles and saplings with signs of infection ("witches brooms") would be slashed. Even so, it is unlikely that all infected hosts would be killed. There are no known practical means by which *Armillaria ostoyae* or *Phaeolus schweinitzii* can be eradicated. The best strategy is to promote species less susceptible to these pathogens i.e. western larch and ponderosa pine. Harvest would remove the majority of merchantable Douglas-fir and subalpine fir (of which there is very little). Harvest would retain the majority of western larch and ponderosa pine. The majority of sub-merchantable Douglas-fir and subalpine fir would remain post-harvest, although some would be damaged and cut within skidding and harvest corridors. Post-harvest, *Armillaria ostoyae* would colonize stumps and roots of trees harvested

causing increased inoculums levels, rate of spread and mortality of adjacent susceptible tree species, largely sub-merchantable Douglas-fir. Whereas western larch and ponderosa pine are resistant to A. ostoyae they may not be completely immune to high inoculums levels of *Armillaria ostoyae*. Post-harvest these species could be more vulnerable to increased inoculums levels for 2-3 decades. Inoculum potential would slowly decline as roots of stumps deteriorate (Hagle et al. 2003). Harvest would greatly reduce Douglas-fir coverage primarily via over-story removal of sawtimber and cutting sub-merchantable trees within skidding corridors. Promoting regeneration (or planting) of ponderosa pine and western larch and the development of a new age class of younger, more vigorous trees would be advantageous for the development of stands more resistant to *A. ostoyae* and *P. schweinitzii*. Over time, the increasing presence of ponderosa pine and western larch would be more productive than stands dominated by Douglas-fir. Coverage of Douglas-fir would likely persist, ongoing mortality and volume loss would continue, inhibiting the development of persistent over-mature Douglas-fir forest cover.

Forest fuels: Slash generated from harvest activities consisting of needles, fines (tree limbs) and coarse-woody debris (tree limbs, tops and un-sound boles) would be retained or returned to harvest areas to recycle nutrients. It is estimated that of the slash generated from the proposed harvest activities: approximately 25-35% would be concentrated at landings and the majority of slash cleared from within newly constructed road R-O-W's would be burned. A portion of the logging slash would be retained or returned within harvest areas. The Timber Sale Contract would stipulate retention of approximately 5-10 tons per acre of fine fuels (< 3'' diameter, limbs and foliage) and coarse woody debris (>3" in diameter). In some areas total slash accumulations of up to approximately 30 tons per acre would be possible through retention or returning coarse woody debris to within harvested areas. Slash would be lopped and or trampled to within 18" or less of the ground. Excessive amounts of slash, accumulations at landings and along roads, that were not scattered, would be piled and burned. Fuel breaks would be employed along newly constructed roads (≥ 50' above and below), property boundaries (66'- 100' wide) and along ridge top locations.

Risk of fire: Logging slash retained or returned to within harvest areas could increase the risk of effects from wildfire in the short term (1-5 years approximately). Short term increases of fine fuels would increase a fires rate of spread, should a fire ignite. Increased fuel loading would increase fire intensity (increased: heat, flame length and duration) and resistance to control should a fire ignite.

Mitigating risk of fire: Trampling, scattering and lopping slash within 18" of the ground surface is intended to minimize flame lengths to 4' or less should a fire ignite. Should a fire ignite fuel breaks would help to contain and control surface fires, and help keep fire on the surface i.e. help prevent crown fire.

Emulating Fire: The proposed harvest boundaries would closely follow patterns created by past fires. Proposed restoration treatments within ponderosa pine cover and Old Growth ponderosa pine, and proposed maintenance treatments (retention) of western larch are consistent with ARM 36-11-418. Most fire resistant western larch and very resistant ponderosa pine would be retained within all areas harvested (where these species occur). Retention of western larch especially would be a high priority: being the most fire resistant species and its cover is limited currently on Missoula Unit and where more cover should be on generally northerly aspects within the project area.

Forest cover types: Table 7-1 shows that the current forested cover type condition would not change substantially post-harvest i.e. cover types and distributions thereof would not be shifted substantially. Considering stands that would be affected by harvest, there are only two stands in an inappropriate cover type condition. Stand 16 is currently ponderosa pine and Stand 17 is western larch/ Douglas-fir, both are modeled as appropriately Douglas-fir. Because Douglas-fir sawtimber would be harvested the cover type of neither one of these stands would be shifted. All other stands (that would be affected by harvest) are currently and appropriately either western larch/ Douglas-fir or ponderosa pine cover types.

Structure: Harvest of Douglas-fir sawtimber within stands all currently classed as multi-storied structures would result in the reduction of vertical structure. However of all the stands that would be affected by harvest they all have sufficient coverage of either western larch or ponderosa pine that they are currently either western larch/Douglas-fir or ponderosa pine cover types. So even if all of Douglas-fir sawtimber where harvested from

the upper canopy layer, there would be sufficient western larch or ponderosa pine in the upper canopy layer to maintain multi-storied structured stands where post-harvest the majority of sub-merchantable trees that compose the middle and lower layers would be retained.

Age class: Harvest would remove the majority of Douglas-fir sawtimber, which is estimated to range from 80-150+ years old. Consequently age classes associated with the area affected by harvest would be effectively decreased the equivalent of approximately 103 acres currently classed as Old ≥ 150 years. Table 7-9 shows both current age class distributions and the effects of the proposed harvest upon them. The effect to Missoula Unit age class distributions would be negligible,103 acres is approximately 1/8% of Missoula Unit's net forested acres.

Table 7-9: Age Class distributions (current data source is SLI 11-12-2013):

Analysis Areas:	Percent of Area by Age Class Groups			
	0-39	40-99	100-149	150+
Section 16: Current	0%	0%	15%	85%
Section 16: Post-harvest estimate	0%	11%	20%	69%
Area that would be affected by proposed harvest: Current	0%	0%	4%	96%
Post-harvest estimate of area affected by harvest	0%	35%	21%	44%

Throughout the proposed harvest areas, large diameter Old ponderosa pine (up to 8 tpa) and western larch (up to 10-17 tpa) would be retained as individuals and in groups where they occur. Improvements to overall stand vigor through stocking reduction should improve the potential for Old Growth ponderosa pine to develop in the long term. The proposed restoration treatment within 25 acres estimated as probable Old Growth ponderosa pine would retain a minimum of 8 ponderosa pine tpa ≥ 21" dbh. The harvest of some Old trees predominantly Douglas-fir and including ponderosa pine exhibiting poor vigor within this area poses a low to moderate risk of reducing both the quality and quantity of Old Growth attributes (numbers of Old large diameter trees, snags and coarse-woody debris). However, reducing the stocking level overall should improve residual stand vigor, decrease the incidence of insect and disease and reduce the risk of high severity fire effects within 1-5 years post-harvest. Implementation of the proposed harvest treatments: both maintaining current Old Growth and promoting development of Old Growth should result in up to 24% of the proposed harvest area having a greater potential to be Old Growth long term.

Alternative B: Harvest, Cumulative Effects on Forest Vegetation

The proposed harvest would account for approximately a quarter of one percent of the total forested net acreage on the Missoula Unit. Thus, any potential impacts or modifications to forests within the project area, when compared at the scale to which Missoula Unit's forested lands would be correspondingly affected, would be relatively negligible.

There is a low to moderate risk that the proposed harvest would reduce the quantity and quality of Old Growth within the proposed harvest areas, as a direct result of harvesting Old Douglas-fir sawtimber. Even though some Old Douglas-fir sawtimber would be harvested from within the 25 acre ponderosa pine stand classified as Old Growth, it is estimated that it should remain Old Growth post-harvest. Because Douglas-fir sawtimber is more susceptible to root rots and Douglas-fir beetle, it is unlikely that Douglas-fir would continue to become Old Growth and it would be more temporal than ponderosa pine or western larch long term. Root rots would continue to recycle Douglas-fir inhibiting development of Old Growth Douglas-fir.

There is the potential that continued harvest within Old stands on Missoula Unit and/or the effects of wild fire or any other disturbance, such as insect mortality would:

1. Contribute to the reduction of both Old Growth and Old Stands further below what Losensky predicted.
2. Postpone the condition when, the Age Class Distribution on Missoula Unit approximates the Historic Age Class Distributions as predicted by Losensky.

Noxious Weeds:

There is a concern that forest management activities may result in the introduction of new weeds or increased spread of noxious weeds from the proposed forest management activities.

Noxious weeds occurring in the project parcels are mainly a combination of knapweed (*Centaurea maculosa*), houndstongue (*Cynoglossum officinale L*) and spot infestations of toadflax . Knapweed was found along roadsides as well as in some forested portions of the project area. Houndstongue was found mostly along roadsides along the access haul routes within project sections and on adjacent lands. Approximately 4 miles of roadside weeds were treated in 2013 along the access route. Spot infestations of Toadflax were noted on a roadside (likely bird introduced) and was treated in 2013 and will be monitored and retreated if needed. Road use, timber harvest activities, grazing, and soil disturbance from fire are most likely the reasons for the existing rate of spread of noxious weeds and the potential future spread and introduction of noxious weeds. The prevailing winds from the Clark Fork valley and lower Blackfoot also carry windblown weed seed throughout this area. Moist sites with well established surface vegetation provide a competitive advantage over noxious weed establishment. Reseeding of some roadcuts followed by roadside, spot herbicide treatments and release of bio-control insects have been made on noxious weeds on portions of all of the project sections and this has helped reduced the spread of noxious weeds. DNRC has completed herbicide treatments along portions of the access road in 2013, yet weeds continue to spread by wind, animals and vehicles. Weed management treatments on adjacent ownerships in the area varies from no-action to combinations of revegetation, herbicide treatments and bio-control measures.

No-Action Alternative: Direct, Indirect, and Cumulative Effects on Noxious Weeds

With no action, noxious weeds will continue to spread along roads and may increase on the drier site habitats. Limited weed control efforts on access roads across multiple ownerships in the area, increases the potential for windblown seed. Following disturbance events such as fires, or grazing, the establishment and spread of noxious weeds can be more prevalent than in undisturbed areas. DNRC would continue to treat selected sites on DNRC roads based on priorities and funding availability, but the levels of weed control treatments would be lower than with the Action Alternative. If new weed invader species are found they would have highest priority for management. On state land parcels, the grazing licensees would be required to continue weed control efforts consistent with their use.

Cumulative effects of noxious weeds within the project areas are moderate. Weeds have spread across ownerships over time by multiple uses from wind, fire, traffic, forest management, wildlife and grazing animals. As tree density and ground cover vegetation increases over time, weeds are reduced through vegetative competition.

Action Alternative: Direct, Indirect, and Cumulative Effects on Noxious Weeds

Implementation of the Action Alternative would involve ground-disturbing activities that have the potential to introduce or spread noxious weeds in susceptible habitat types. For the Action Alternative, an Integrated Weed Management (IWM) approach was considered for treatment of existing and prevention of potential noxious weeds. For this project: prevention, revegetation of new roads and weed control measures on existing roads are considered the most effective weed management treatments. Prevention measures would require cleaning of off-road equipment prior to use. Roadsides would be sprayed prior to operations and weed control and revegetation would slow noxious weed spread and reduce weed density and occurrence compared to no-action. There would be a similar or slight potential for an increase in weed infestation within harvest units due to soil disturbance and reduction of tree canopy. The silvicultural prescriptions are designed to control disturbance and scarification to levels needed for sustained forest growth. Noxious weeds control efforts would promote rapid revegetation and emphasize treatment of any new noxious weeds found.

Herbicide application would be completed on segments of DNRC roads along the haul route, to reduce weed spread along roads and promote desired vegetation for weed competition and to reduce sedimentation. Herbicide would be applied according to label directions, laws and rules, and would be applied with adequate buffers to prevent herbicide runoff to surface water resources. Implementation of IWM measures listed in the mitigations are expected to reduce existing weeds, limit the possible spread of weeds, and improve current conditions, to promote existing native vegetation. More weed control would occur compared to the No-Action Alternative and grass and competitive vegetation would increase along roads.

Overall cumulative effects of increased noxious weeds within the project area, are expected to be moderate, based on herbicide treatments of existing weeds along roads and implementing prevention measures to reduce new weeds, by cleaning equipment and planting grass on roads to compete against weeds. The combined efforts of weed control across ownerships continues to improve through cooperative efforts with the Missoula County Weed District and local weed control interest groups including the Blackfoot Challenge.

Vegetation References can be found in Attachment E

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8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:
Consider substantial habitat values and use of the area by wildlife, birds or fish. Identify direct, indirect, and cumulative effects to fish and wildlife.

Issues: There is concern that the proposed activities could alter forested habitats, including mature forested habitats and/or landscape connectivity, which could affect species that rely on these mature forested habitats, and/or alter connectivity and the ability of wildlife requiring corridors to move through the landscape. Alterations of habitat including construction of roads could reduce secure areas: by increasing site distances, increasing hunter access, increasing the risk to displace wildlife species and increase human-caused mortality.

Introduction
A variety of wildlife species rely on mature to old stands for some or all life requirements. A partial list of these species includes pileated woodpeckers (*Dryocopus pileatus)*, American marten (*Martes americana*), brown creepers (*Certhia americana)*, and winter wrens (*Troglodytes troglodytes*). Wildlife species that require connectivity of forest habitat types between patches, or those species that are dependent upon interior forest conditions, can be sensitive to the amount and spatial configuration of appropriate habitats. Connectivity of forested habitats facilitates movements of those species that avoid non-forested areas and other openings; connectivity under historical fire regimes likely remained relatively high as fire differentially burned various habitats across the landscape.

The detailed analysis (attached) considers the effects of both Action and No-Action Alternatives on: grizzly bears, Canada lynx, flammulated owls, pileated woodpeckers, fisher, Big Game species (e.g. elk), with respect to their habit requirements and Mature Forested Habitats and Landscape Connectivity.

Analysis Area
Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on a 44,442-acre area described above in the Analysis Areas portion of this analysis. This scale of analysis would be large enough to support a diversity of species that use mature forested habitats and/or require connected forested habitats.

Affected Environment
The project area currently contains approximately 631 acres (98% of project area) of mature stands (100-plus years in age) of primarily Douglas-fir stands that have a reasonably closed canopy. Currently, forested areas cover most of the project area, facilitating some use by those species requiring connected-forested conditions and/or forested-interior habitats. On the DNRC-managed portions of the cumulative effects analysis area, roughly 2,025 acres (11%) of mature Douglas-fir and western larch habitats exist that have a reasonably closed (>40%) canopy. A portion of the 479 acres (24% non-DNRC lands) of reasonably closed forested habitats and some of the 488 acres of moderately stocked forested stands (25% non-DNRC lands) on other ownerships in the cumulative effects analysis area are likely also providing habitat for those species requiring mature, forested habitats and or forested connectivity. Conversely, much of the 1,002 acres (51% of non-DNRC lands) of shrubs, herbaceous areas, poorly stocked forested stands, and recently harvested stands on other ownerships in the cumulative effects analysis area is likely too open to be useful for these species requiring forested habitats. Past timber management, human developments, roads, and the natural openness of certain habitats in the cumulative effects analysis area has partially reduced landscape-level connectivity in the cumulative effects analysis area. Past harvesting has reduced the amount of mature, forested habitats in portions of the cumulative effects analysis area.

Alternative A; No-Action:
Current land use within the project area would not change i.e. grazing and non-motorized recreational use (e.g. hunting) would continue.

No appreciable changes to existing stands would be anticipated. Stands providing forested cover that may be functioning as corridors, including riparian areas, saddles, and ridgelines, would not be altered. Continued successional advances are moving stands toward mature forests. This alternative would continue to contribute to the amount of mature forested stands in the cumulative-effects analysis area

With continued fire exclusion Douglas-fir will continue to dominate most sites within the project area. Douglas-fir would remain at risk to mortality from root rot pathogens and Douglas-fir beetle. Canopy cover afforded by predominantly Old Douglas-fir sawtimber over time would continually decrease. As overstory trees die intermediate pole size trees and overtopped seedlings and saplings within multi-storied structures would slowly increase growth. Eventually the most vigorous free to grow individuals would establish dominance forming a new upper canopy layer which would gradually increase in crown density. As they increase in size and compete for light, water and nutrients, least vigorous trees, least resistant to Armillaria ostoyae so predisposed would die and or be killed by Douglas-fir beetle. Beetle attacked trees would provide food and habitat for woodpeckers. Down fallen dead trees would provide habitat and forage sites for a variety of species composing part of the food web. Species composition would gradually continue to shift in favor of shade tolerant species e.g. Douglas-fir (primarily) and subalpine fir. Douglas-fir (primarily) would crowd and out-compete shade intolerant western larch and ponderosa pine, precluding regeneration thereof, all the while increasing the risk of stand replacement fire. Long term, coverage of large diameter western larch and ponderosa pine would decrease, important habitat elements for both cavity nesting species i.e. Flammmulated owls and pileated woodpeckers.

Thus, a negligible risk of adverse direct and indirect effects to pileated woodpeckers would be expected since long-term, succession-related declines in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would be anticipated. Generally, no risk of adverse direct and indirect effects; and no adverse cumulative effects are anticipated for wildlife species (except pileated woodpeckers aforementioned).

Alternative B: Action:

Motorized access to the project area within Township 13N, R17W would remain restricted, under both Action and No-Action alternatives.

Wildlife mitigations (see Wildlife report page 67) would be incorporated by design and Timber Sale Contract Stipulations, which would be enforced by the Forest Officer. Timber Sale Contract stipulations would preclude contractors from carrying fire arms or hunting within the project area. Any camps if allowed within the project area would require food stuffs (or attractants including garbage) to be contained in bear-proof containers.

Wildlife species could be disturbed or displaced during periods of harvest activities. Proposed harvest and road construction and road maintenance would occur during a 3-4 year period. Post-harvest activities i.e. road-side weed spaying and burning of slash may require additional time to complete, but would occur as soon as practicable, and would be short in duration. Burning could span a two week period, typically in fall (November) and road-side weed spraying less than a week (typically June).

Proposed harvest treatments would substantially reduce crown cover of Douglas-fir sawtimber within affected areas. Sub-merchantable Douglas-fir would be damaged and cut within skidding corridors which could occur on up to 14% of the area affected by harvest.

Visual screening and hiding cover would be reduced, but considerable visual screening would be retained. Slight increases in sight distance would be anticipated post harvest. This would decrease security cover within the South half of Section 16 for big game species that utilize the project area during hunting season. Whereas crown cover reductions on the southerly aspects of (the South half) Section 16 would make big game easier to spot by hunters, negligible changes in big game survival would be anticipated. This is due in part to the location of Section 16 relative to hunter access points. It is approximately 4 road miles from the gate to the east that restricts access, to a vantage point affording a view of the south slopes of Section 16.

Functional corridors for wildlife movement would be retained. Harvest within lynx habitat would reduce crown cover below 40% rendering 44 acres (17% of project area lynx habitat) temporarily un-suitable (1-3 decades). Whereas habitat connectivity could be altered, corridors would be maintained to facilitate lynx movement and utilization of habitats. Harvest would not occur within Stream-side Management Zones or associated riparian areas important habitat components for fisher. Harvest would reduce snags, snag recruitment trees and coarse-woody debris overall, however some of these resources would be retained. Harvesting would open denser stands up while retaining elements of forest structure used for foraging and nesting by flammulated owl, improving flammulated owl habitat conditions. However, elevated disturbance levels associated with harvesting could negatively affect flammulated owls should activities occur when flammulated owls are present. Thus, a minor risk of adverse direct, indirect and cumulative effects would be expected to flammulated owls.

Harvest would reduce the amount of continuous-forested habitats available including potential nesting and foraging habitats important to pileated woodpeckers by decreasing the number of trees including snags and snag recruits. However the majority (68%) of existing habitats would be retained. Mitigation measures (see page 45) to retain some snags and snag recruits would be included by design. Proposed harvest treatments would retain large diameter western larch and ponderosa pine, including those with cavities and or signs of extensive rot. These trees are important habitats for both species of cavity nesters i.e. pileated woodpeckers and flammulated owls.

Fisheries:

There is a concern that the proposed forest management actions may have effects to fisheries due to sedimentation.

No Action Alternative: Direct, Indirect, and Cumulative Effects

Implementation of the No-Action Alternative would result in no fisheries resource impacts in the project area. Fisheries conditions would remain similar to those described in the existing conditions sections of this Environmental Assessment.

Action Alternative: Direct, Indirect, and Cumulative Effects

Implementation of the Action Alternative would be a combination of improvement and salvage harvest of dead, dying and high-risk trees and thinning to reduce competition and improve growth of diverse tree species. The proposed harvest is low to moderate intensity, selection harvest of 203 acres. The proposed harvest above Heyers Gulch is upslope of an existing road and over 125 feet from Heyers Gulch at the nearest point, which is outside of the SMZ and RMZ for Heyers Gulch.

Approximately 4 miles of new road would be constructed on dry sites with no new stream crossings. On existing roads, road maintenance, site specific road reconstruction requirements and all BMP's would be implemented to improve road drainage and control erosion. Road maintenance and repairs would likely result in short duration, low levels of sedimentation that would quickly subside. All new roads would be grass seeded with site adapted grass to speed revegetation and control erosion and sedimentation.

In the event that road infrastructure funds become available, the existing steel railroad car bridge in the NW of section 21 T13N, R17W would be replaced with a new steel bridge of longer span, at the same location. If the bridge is replaced, all operations would meet BMP's for site specific erosion control and any requirements of an FWP 124 permit for the crossing replacement. The bridge replacement would likely result in a short term, direct impact to sediment, during construction based on comparison to previous crossing replacements. The possible bridge replacement would also result in a long term minor reduction in existing sediments and no measurable change in in-direct or cumulative effects.

The proposed project has overall low potential for low direct, indirect or cumulative impacts to fisheries based on the following:

1. No harvest adjacent to Class 1 fishery stream.
2. Stream channel conditions are stable and resilient.
3. Short duration minor sediments from road repairs.
4. Moderate harvest away from streams, planned road repairs and maintenance to reduce sediment.
5. Road construction on dry sites with no new stream crossings.
6. Implementation of BMP's, applicable rules and attached mitigations.

For complete Fisheries analysis see Attachment C: Water & Fisheries Analysis Report.

For complete Wildlife analysis, see <u>Attachment D:</u> Wildlife Analysis Report.

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9. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES:

Consider any federally listed threatened or endangered species or habitat identified in the project area. Determine effects to wetlands. Consider Sensitive Species or Species of special concern. Identify direct, indirect, and cumulative effects to these species and their habitat.

Unique and/or endangered fisheries and terrestrial species analyses are included in the Wildlife and Fisheries analysis reports attached.

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10. HISTORICAL AND ARCHAEOLOGICAL SITES:

Identify and determine direct, indirect, and cumulative effects to historical, archaeological or paleontological resources.

The DNRC has no record of cultural resources within the Project's area of potential effect. However, a professional inventory of cultural resources has not been conducted. If previously unknown, cultural or paleontological materials are identified during project related activities, all work would cease until a professional assessment of such resources can be made. No Culturally Modified Trees where found within areas that would be affected by harvest. Care was taken to identify any ponderosa pine that may have had their cambium harvested by Native Americans. The majority of ponderosa pine were marked for retention. Given the elevation, steep slope and remoteness of harvest areas from any practical travel routes that may have been used by Native Americans, it is unlikely that any Culturally Modified Trees are present within proposed harvest areas.

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11. AESTHETICS:

Determine if the project is located on a prominent topographic feature, or may be visible from populated or scenic areas. What level of noise, light or visual change would be produced? Identify direct, indirect, and cumulative effects to aesthetics.

<u>Alternative A: No Action</u>

No change to existing conditions.

<u>Alternative B: Action</u>

A portion of the harvest area would be visible from Highway 200 between the 4 and 5 mile markers (approximately 1 to 1 ½ miles distant) and the Blackfoot River Valley below. Harvest areas and new roads on a portion of the west and north aspects within the St. Lawrence drainage would be visible. The harvest area that would be potentially visible is approximately 30 acres. It is estimated that approximately 4/10 mile of new road would be potentially visible although portions of this would be partially screened by leave trees. An approximately 3 acre harvest area on the west aspect close to the saddle and ridge top may be most noticeable because of the location (along the skyline) and that the majority of the over story Douglas-fir would be harvested, snags and ponderosa pine seed trees would be retained. It is estimated that the most noticeable new road segment potentially would be that on the north aspect within the St. Lawrence drainage. Although it would be partially screened by leave trees, the fact that the cut and fill portion of a segment of this new road approximately 400-500' long would be 80-115' wide would make it unlikely that it would not be noticeable at least initially. A portion of this road segment close to its western terminus, winds its way through a draw which would help obscure it by forming an oblique view of it from below. It would be decreasingly noticeable over time (at least a decade) as it is re-vegetated with native grasses, forbs, trees and shrubs.

The remainder and majority of the proposed harvest area is within the Heyers Gulch drainage and due to its location it would be visible only when viewed from within the Heyers Gulch drainage from west and north aspects across Heyers Gulch from within ½ to 1 mile distant. Access to this area is restricted to non-motorized use, thus not very many people do or would frequent this area.

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12. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY:

Determine the amount of limited resources the project would require. Identify other activities nearby that the project would affect. Identify direct, indirect, and cumulative effects to environmental resources.

No negative direct, indirect or cumulative effects are expected to occur as a result of the proposed project.

13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

List other studies, plans or projects on this tract. Determine cumulative impacts likely to occur as a result of current private, state or federal actions in the analysis area, and from future proposed state actions in the analysis area that are under MEPA review (scoped) or permitting review by any state agency.

Washoe Creek Timber Sale EA 2011.
Kamas Point Timber Sale EA 2012.
McNamara Landing Timber Sale EA 2012.

IV. IMPACTS ON THE HUMAN POPULATION

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

14. HUMAN HEALTH AND SAFETY:

Identify any health and safety risks posed by the project.

Log truck traffic would increase temporarily on Bear Creek Road, which could create a hazard for road users. Impacts to Human health from dust or smoke generated by timber sale activities would be short term and or mitigated. DNRC project-related activities would comply with and be subject to any applicable rules or laws. The Timber Sale Contract would stipulate signing of roads to alert road users of traffic associated with Timber Sale Activities. The DNRC Forest Officer would communicate safety related concerns, such as warning Contractors to be cognizant of times when commuters and school children are on or along roads. Contract Operations would be monitored for safety by the Forest Officer. Whereas some local residents who use Bear Creek Road are concerned about traffic related safety issues, they are likely accustomed to this type of commercial truck traffic which has occurred for many years past and as recently as 2010.
Considering the above mitigations, direct indirect and cumulative effects to human health and safety would be low.

15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:

Identify how the project would add to or alter these activities.

The proposed timber sale, if implemented, would provide short term employment for logging, trucking and road building contractors. Forest products that would be supplied to and processed at local timber mills would be additive to other available quantities. People are currently employed in the wood products industry in the region. Due to the relatively small size of the timber sale, there would be no measurable direct, indirect, or cumulative effects from this proposed action on industrial, commercial and agricultural activities and production.

16. QUANTITY AND DISTRIBUTION OF EMPLOYMENT:

Estimate the number of jobs the project would create, move or eliminate. Identify direct, indirect, and cumulative effects to the employment market.

According to the Montana Bureau of Business and Economic Research a general "rule of thumb" is that for every million board feet of sawtimber harvested in Montana ten person years of employment occur within the forest products industry. The proposed harvest would contribute a portion of the sustained yield harvest from DNRC Trust Lands. As such, the proposed timber harvest would not create new employment but rather, if implemented, would sustain processes and production. Thus, potentially 15 to 20 person years of employment could be sustained within the forest products industry.
Because of the small size of the project, no long term direct, indirect or cumulative effects to quantity and distribution of employment are expected.

17. LOCAL AND STATE TAX BASE AND TAX REVENUES:

Estimate tax revenue the project would create or eliminate. Identify direct, indirect, and cumulative effects to taxes and revenue.

The proposed action would create short term employment for a logging contractor who would in turn pay federal and state income tax. Logs would likely be processed at local mills by mill employees who would pay income tax.

Due the temporary nature of the project and limited amount of volume harvested, it is unlikely that the proposed action would have any direct, indirect or cumulative effects to taxes and revenue.

18. DEMAND FOR GOVERNMENT SERVICES:

Estimate increases in traffic and changes to traffic patterns. What changes would be needed to fire protection, police, schools, etc.? Identify direct, indirect, and cumulative effects of this and other projects on government services

Hauling of forest products would increase traffic temporarily on Bear Creek Road and Highway 200. Forest products have been hauled over these roads for over fifty years. The hauling of forest products on Bear Creek Road has predominantly been the result of harvest from Commercial Timber Company lands. The Nature Conservancy hauled forest products over this road system as late as 2010

The Timber Sale Contract period would be three years. Transportation of forest products (hauling), road maintenance, re-construction of road segments and construction activities would be on-going within this three year period. It is estimated that approximately 260-390 loads of logs would be hauled within the three year period. The majority of hauling would likely occur during the last two years of the Contract period. Final road maintenance activities would occur after hauling is completed.

There would be no measurable direct, indirect or cumulative effects related to demand for government services due to the relatively small size of the project. There would be a short-term increase in truck traffic but it would be considered normal to the local community and industrial base.

19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS:

List State, County, City, USFS, BLM, Tribal, and other zoning or management plans, and identify how they would affect this project.

NA

20. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES:

Identify any wilderness or recreational areas nearby or access routes through this tract. Determine the effects of the project on recreational potential within the tract. Identify direct, indirect, and cumulative effects to recreational and wilderness activities.

Motorized access to DNRC lands within T13N, R17W is currently restricted. The Action Alternative would not change the status of motorized restrictions.

21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING:

Estimate population changes and additional housing the project would require. Identify direct, indirect, and cumulative effects to population and housing.

There would be no measurable direct, indirect, or cumulative impacts related to population and housing due to the proposed project.

22. SOCIAL STRUCTURES AND MORES:

Identify potential disruption of native or traditional lifestyles or communities.

No measurable direct, indirect, or cumulative effects would be expected under either alternative.

23. CULTURAL UNIQUENESS AND DIVERSITY:

How would the action affect any unique quality of the area?

No negative direct, indirect, or cumulative effects would be expected under either alternative

24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:

Estimate the return to the trust. Include appropriate economic analysis. Identify potential future uses for the analysis area other than existing management. Identify direct, indirect, and cumulative economic and social effects likely to occur as a result of the proposed action.

Alternative A - No Action

Current non-motorized recreational use and grazing would continue within and surrounding the project area. The amount of revenue generated for trust beneficiaries from these sources (although generated yearly and perhaps continually) is estimated to be a thousand times less on a yearly basis than Alternative B.

Alternative B – Forest Management Projects (Action)

The proposed action has a projected harvest volume of 1-1.5 million board feet (or 7,000- 10,500 tons). It is estimated that the timber would sell for approximately $25.00 per ton and that the total gross revenue would be approximately $175,000 - $262,500, distributed to the Common School and Lands Acquired -Public Trusts. Forest Improvement collections of an estimated $3.24/ ton would yield between $22,680- $34,020.

Current non-motorized recreational use and grazing would continue. However these activities may be disrupted during harvest activities: transportation of forest products, road construction/ and maintenance, timber harvest and burning of slash. The timber sale contract would be three years and burning of slash and weed spraying would likely require an additional year to complete some of these activities. This could reduce recreational use of this area temporarily, e.g. some hunters may choose to go elsewhere during harvest activities.

EA Checklist Prepared By:	**Name:** Jonathan Hansen	**Date:** February 2014
	Title: Project Leader/ Unit Manager	

V. FINDING

25. ALTERNATIVE SELECTED:

Alternative B-Action Alternative

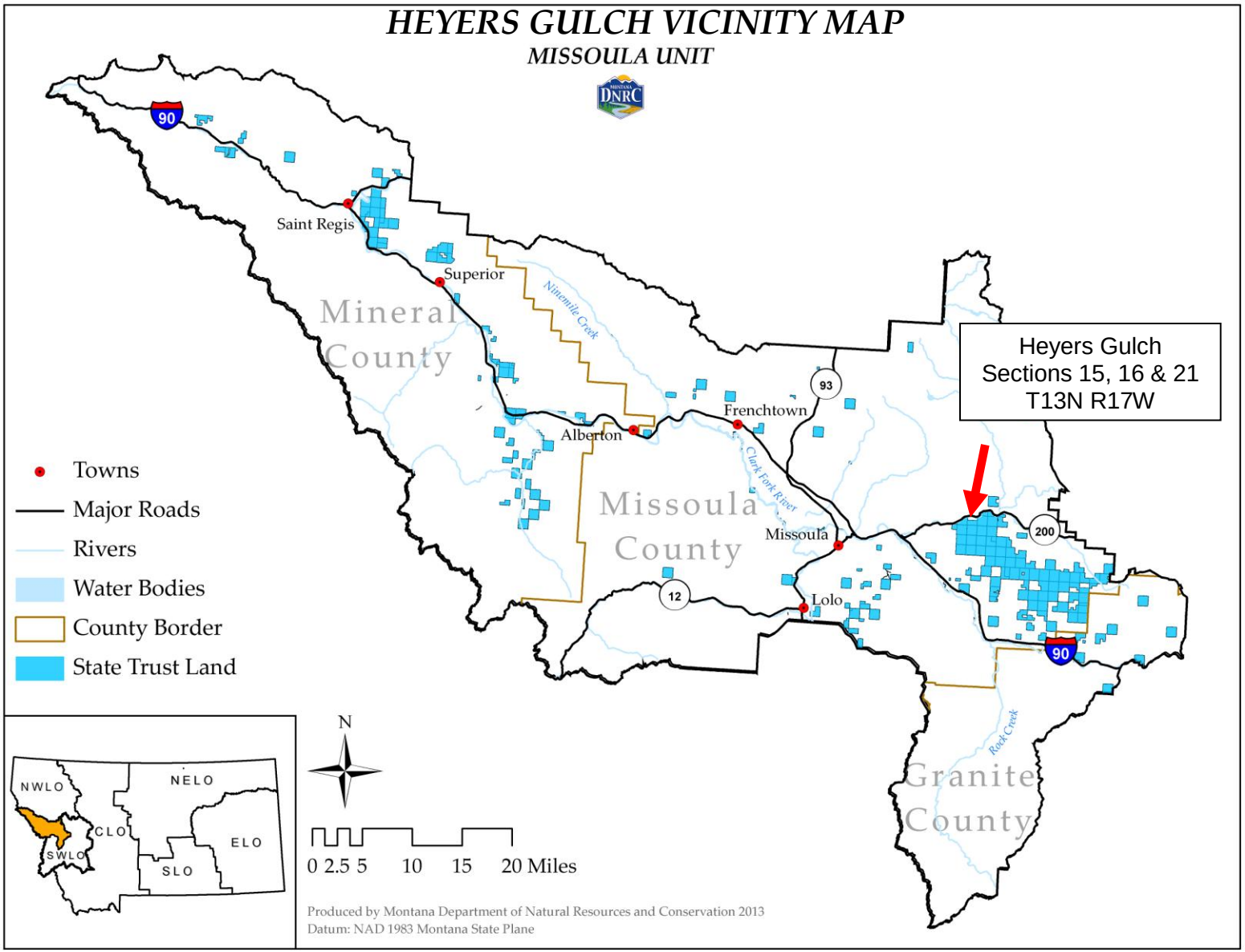
26. SIGNIFICANCE OF POTENTIAL IMPACTS:

No significant impacts identified or predicted.

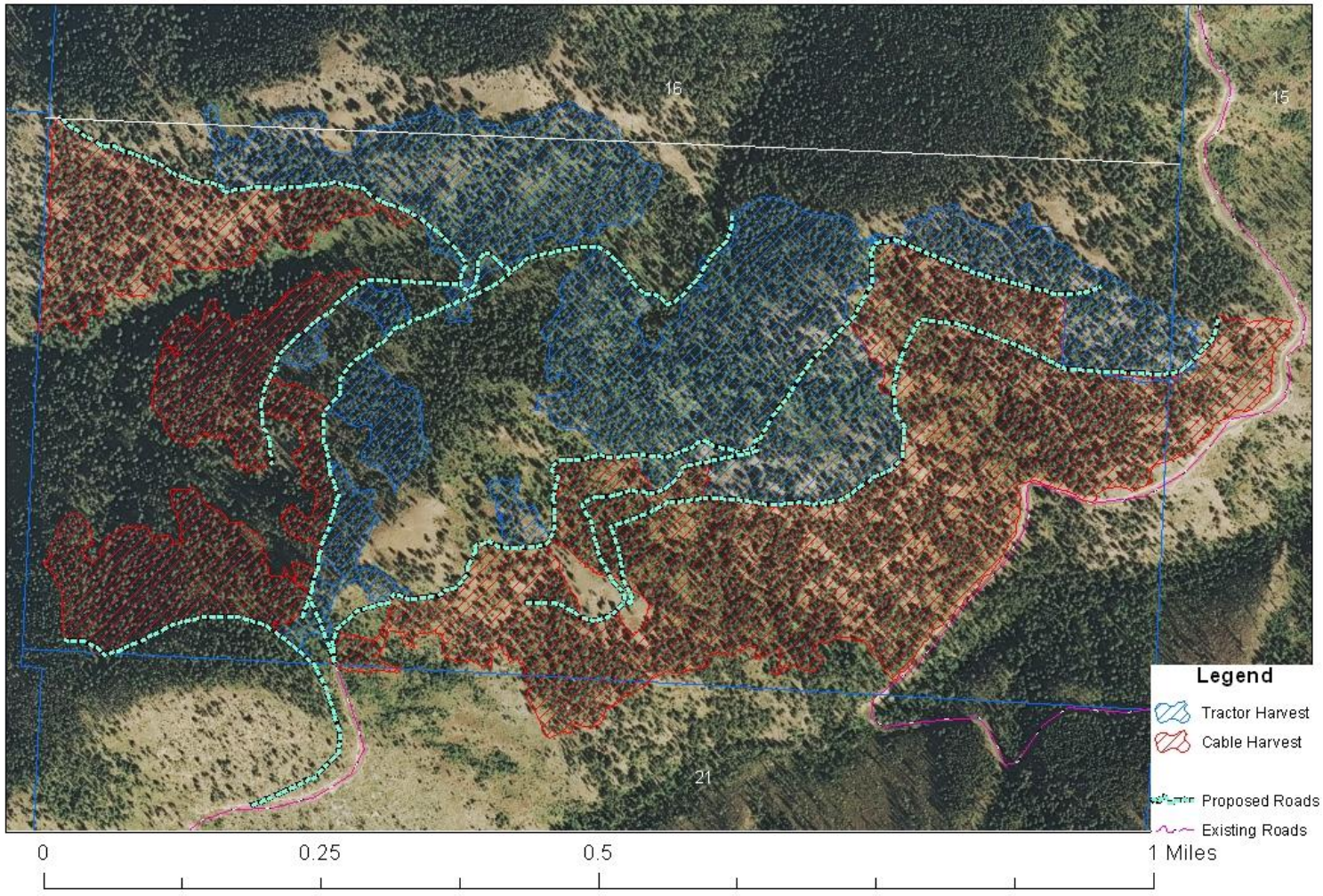
27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

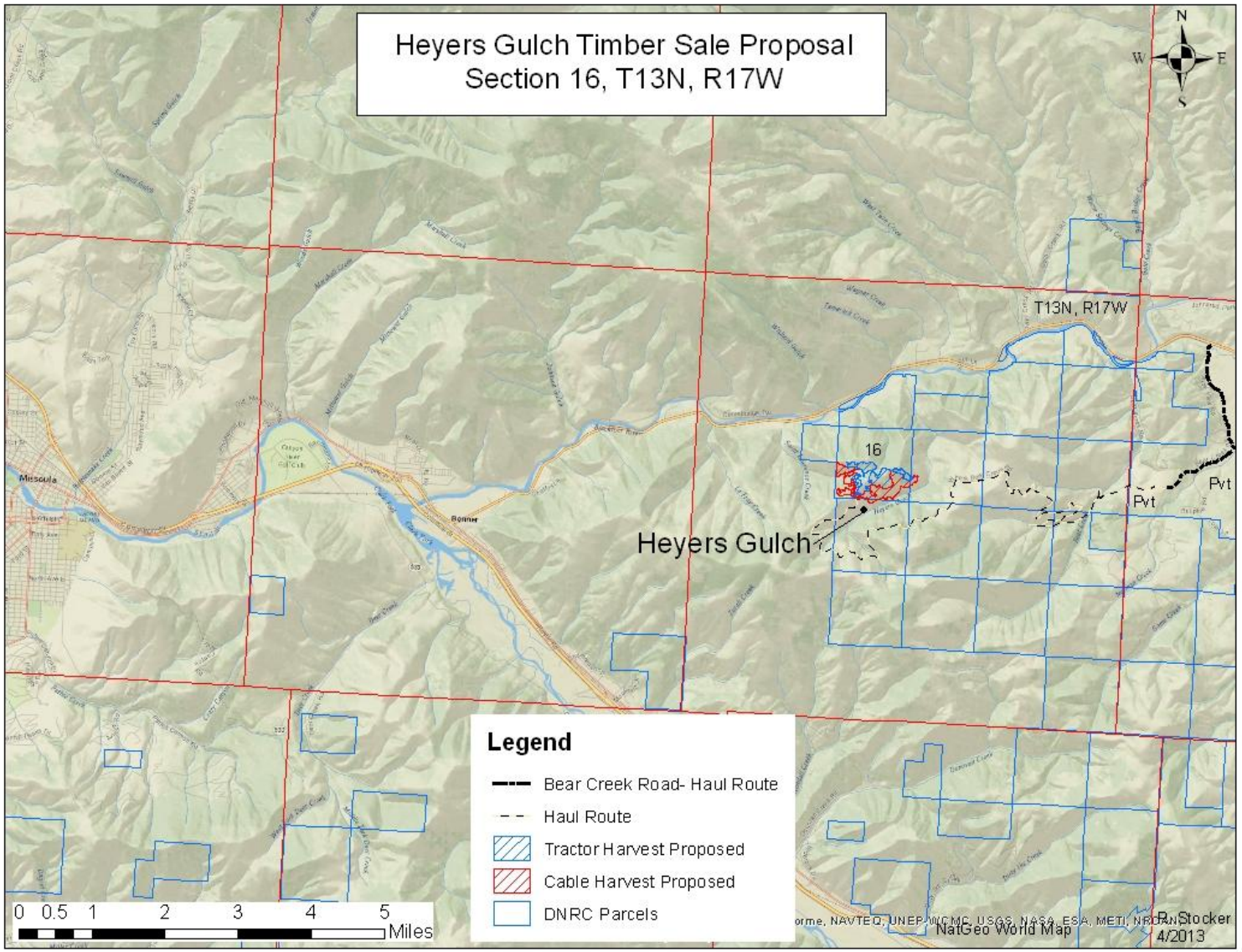
[ ]	EIS	[ ]	More Detailed EA	[X]	No Further Analysis

EA Checklist Approved By:	**Name: Jeff Rupkalvis** **Title: Decision Maker/Forest Management Supervisor**
Signature: /s/ Jeff Rupkalvis	**Date**: March 28, 2014


HEYERS GULCH VICINITY MAP
MISSOULA UNIT
DNRC
Heyers Gulch
Sections 15, 16 & 21
T13N R17W
Saint Regis
Superior
Mineral County
Missoula County
Granite County
Frenchtown
Alberton
Missoula
Lolo
Ninemile Creek
Clark Fork River
Rock Creek
90
93
200
12
Towns
Major Roads
Rivers
Water Bodies
County Border
State Trust Land
NWLO
NELO
CLO
ELO
SWLO
SLO
N
0 2.5 5 10 15 20 Miles
Produced by Montana Department of Natural Resources and Conservation 2013
Datum: NAD 1983 Montana State Plane

Heyers Gulch Project Area
Proposed Harvest and Roads
Sections 15, 16 and 21, T13N, R17W




Heyers Gulch Timber Sale Proposal
Section 16, T13N, R17W
N
W
E
S
T13N, R17W
16
Pvt
Pvt
Heyers Gulch
Missoula
Bonner
Legend
Bear Creek Road- Haul Route
Haul Route
Tractor Harvest Proposed
Cable Harvest Proposed
DNRC Parcels
0 0.5 1 2 3 4 5
Miles
NatGeo World Map
R. Stocker
4/2013

ATTACHMENT B

Heyers Gulch Timber Sale – Soils & Noxious Weeds Analysis

Analysis Prepared By: Jeff Collins, Hydrologist/Soil Scientist, DNRC, 2/27/14

Introduction

The following analysis will describe the existing soil conditions and the anticipated effects to soil resources and noxious weeds within the Heyers Gulch project area. Direct, indirect, and cumulative effects to soil resources and noxious weeds of both the No-Action and Action alternatives will be analyzed.

Issues

Soil Resources – There is a concern that forest management activities may result in increased erosion and reduced soil productivity where excessive disturbance from compaction, displacement, or loss of nutrients occurs, depending on the extent and degree of harvest related soil effects.

Regulatory Framework

The following plans, rules, and practices have guided this projects planning and/or will be implemented during project activities:
All applicable Best Management Practices, State Forest Land Management rules and regulations, and measures outlined in the DNRC Habitat Conservation Plan would be implemented. This includes, but is not limited to silviculture considerations for sustained forest growth (ARM 36.11.420) and biodiversity. As required by ARM 36.11.410 and 36.11.414, adequate vegetative debris shall be left on site to support nutrient conservation whole tree skidding shall be discouraged unless mitigation measures are taken to retain a portion of (fine litter) nutrients on site. The proportions of vegetative materials retained are based on the range of comparable levels determined by Graham et al (1994).

Analysis Methods & Analysis Areas

The methods for disclosing impacts for this analysis include using general soil descriptions and management limitations and then qualitatively assess the risk of negative effects to soil productivity from compaction, displacement and erosion from each alternative.
The soils analysis included an evaluation of Missoula County Soil Survey data, air photos, past harvest designs and on-site field reviews by DNRC hydrologist/soil scientist. For the purposes of this analysis, minor soils of 5% or less of the area were grouped based on slope, soil properties and interpretations. Field reviews were conducted to verify the soil properties and current conditions to assess past and predicted effects based on DNRC soil monitoring results from over 80 DNRC postharvest monitoring projects (DNRC, 2006, 2011). The soil analysis considered soil management interpretations and the physical effects to soils from the area and degree of harvest disturbance associated with skidding and roads. The analysis for soil nutrients considers the area of disturbed surface and the fine litter and coarse woody debris available to supply organic materials to the soil. While the anticipated impacts from each alternative will disclose the direct/indirect effects, the cumulative impacts will be the result of previous and proposed activities.
Direct, Indirect and Cumulative Effects Analysis Areas The analysis area for geology and soil resources includes the proposed harvest units and locations of existing roads and the new and

temporary roads proposed for construction within state parcels of Sections 15, 16, and 21, T13N R17W.

Existing Conditions

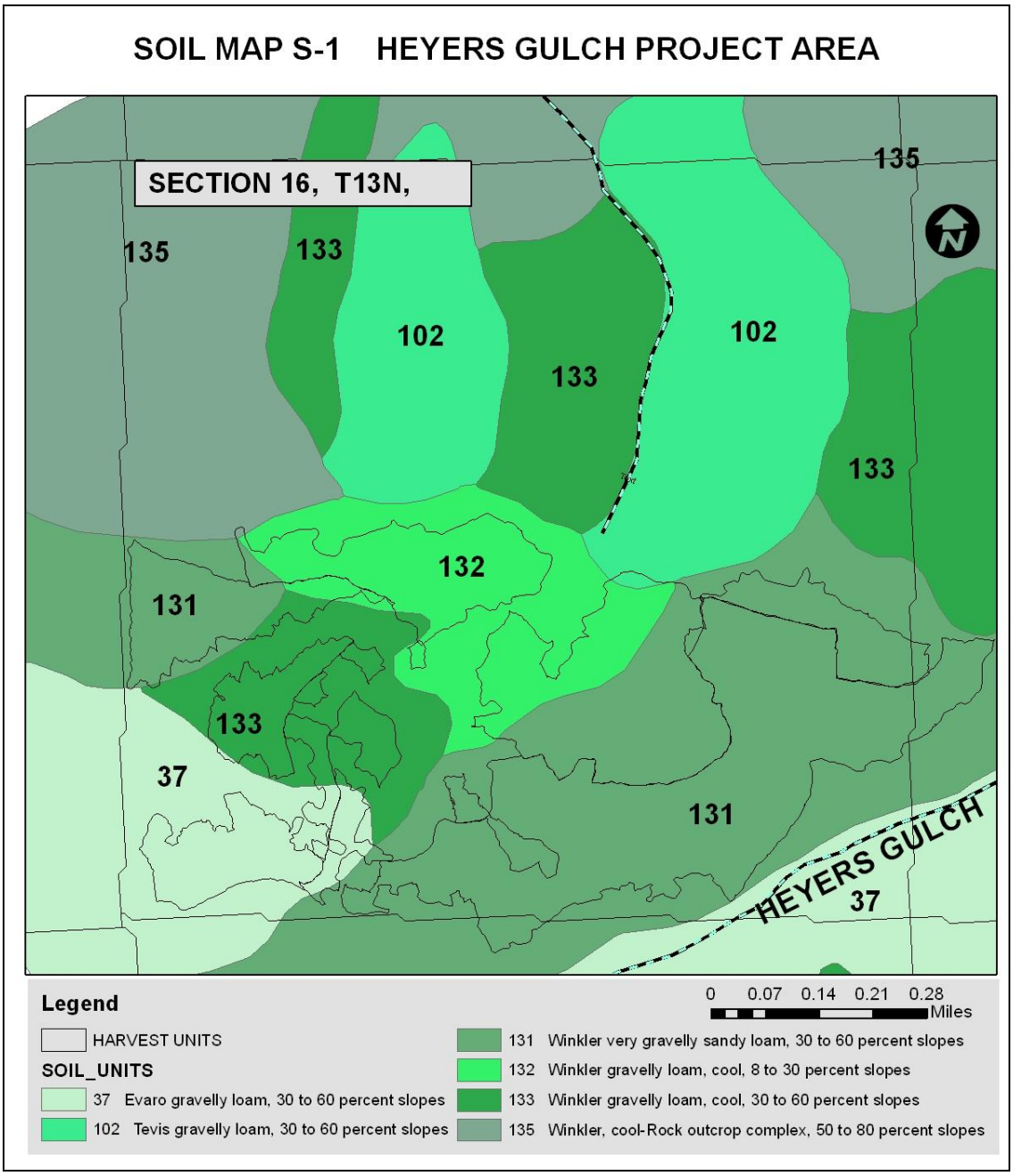
The bedrock geology in the project area includes Pre-Cambrian age meta-sedimentary quartzites, argillites and limestones that are mainly well fractured. The proposed harvest areas are located on the mountain sideslopes and ridges between the Heyers Gulch and St. Lawrence Creek watersheds. The mountain midslopes and sideslopes area steep and have soils forming in moderate to deep colluvial soils with gravelly subsoils.

Bedrock outcrops are common on steeper sideslopes and ridges, and generally rippable, although some spot locations may require jackhammer or blasting for road construction where bedrock is exposed. Balanced road cut/fills are practical up to 55% where slope steepness increases the quantity of material excavated. Material exposed by road construction is subject to rock ravel on steep cutbanks and is difficult to revegetate. No especially unusual or unique geologic features occur in the project area. No harvest areas or road locations are located on areas of slope instability and slope stability will be dismissed from further analysis.

Soil map units are derived from the Missoula County Soil Survey and summary properties and management interpretations are displayed on Soil Maps S-1 and described in attached Table S1. The southerly aspects in Heyers Gulch are shallow to moderately deep (Map unit 131) Winkler very gravelly sandy loams on 30-60% slopes (dry phase). Surface soils are shallow and low to moderate productivity sites supporting ponderosa pine and Douglas fir. All of the soils in the project have high rock contents that makes the materials very stable, resistant to erosion and high water infiltration properties the exceed precipitation rates. The Winkler soils have lower fine contents and lower soil moisture retention. Competition for moisture from understory vegetation and high solar insolation can constrain conifer growth and regeneration. Conifers are subject to drought stress on these very well drained rocky soils and may have more common root rot incidence (Filip 1989).

Soils on the northerly aspects are mainly Winkler very gravelly sandy loams on 30-60% slopes, cool phase. The 132 map unit soils are similar Winkler very gravelly sandy loams on 8-30% slopes. Both soils have generally deeper surface soils and slightly improved growth. Available soil moisture is higher and these soils support ponderosa pine, Douglas-fir and western larch. Minor soils in the proposed harvest areas are Evaro and Tevis very gravelly loams on 30 to 60 percent slopes. Evaro and Tevis soils have slightly greater soil fines, moisture retention and productivity than the Winkler soils. Evaro soils have a shallow reddish, volcanic ash influenced surfaces. Where the volcanic ash soils occur in over 4” depths, potential site growth and seedling establish is improved.

SOIL MAP S-1 HEYERS GULCH PROJECT AREA



Primary soils concern is avoiding displacement of shallow surface soils. Erosion risk can be effectively controlled with standard drainage practices and implementation of BMP's. Predominate slopes of 10-45% are well suited to ground based skidding operations and have a long operational season of use, once soils dry out in the spring. Slope steepness over 45% limits tractor operations due to potential for excessive disturbance and erosion. Cable operations on steeper slopes reduce ground disturbance and impacts. Sediment delivery is concern on the finer textured soils within and adjacent to riparian areas, yet can be mitigated by implementation of buffer areas and implementation of Best Management Practices (BMP's).

Soil Interpretations Table S1 Soils Descriptions and Interpretations for Project Areas S ½ Section 16, and Parts of Sections 15 and 21, T13N, R17W

Map Unit	Mapping Unit Name	Soil Description	Erosion Potential	Displacement hazard	Compaction Hazard	Notes
37	Evaro gravelly loam, 30 to 60 percent slopes	GrSilt Loam colluvium from argillites/qtz Volcanic ash Surface	Mod to high on slopes >45%	Mod to high on slopes >45%	Mod if wet	Most productive soil on site. Limit ground skid to slopes less than 45%
102	Tevis very gravelly loams, 30 to 60 % slopes	Very Gr Loam Colluvium from argillites / quartzite	Mod to high on slopes >45%	Mod to high on slopes >45%	Mod	Mod depth soils, Shallow rock may limit road Limit ground skid to slopes less than 45%
131	Winkler, very gravelly sandy loams, 30 to 60 % slopes	Shallow-mod deep residuum & colluvium Rock common	Mod, very coarse	Mod to high on slopes >45%	Mod	S. Aspect droughty. Limit ground skid to slopes less than 45%
132	Winkler gravelly loams-Cool Site 8 to 30 percent slopes	Mod. Deep residuum & colluvium near ridge	Mod, very coarse	Mod to high on slopes >45%	Mod	Northerly aspect cool and more productive than 131 .Limit ground skid to slopes less than 45%
133	Winkler gravelly loam, Cool Site, 30 to 60 percent slopes	Shallow-mod deep residuum & colluvium	Mod, very coarse	Mod to high on slopes >45%	Mod	Northerly aspect cool and more productive than 131 .Limit ground skid to slopes less than 45%

Effects of Past Management

There is no previous harvest in Section 16. There have been minor previous harvests in portions of the harvest areas of section 15 and 21. Historic harvest effects have largely recovered with vegetation and trees established in secondary trails. A few major skid trails and landing sites are still apparent and harvest effects are estimated to be less than 5% of the proposed harvest units.

Nutrient Cycling & Soil Productivity

With no previous harvest there are moderate to high levels of existing downed course woody debris across the proposed harvest areas that is representative of woody debris levels on similar vegetation types measured by Graham et al. (1994). The tree mortality of insects and disease has resulted in many trees shedding their needles, which helps return organic matter and nutrients to the soil. Root rot pockets may be a partial result of increased vegetative stress on droughty sites and shallow soils (Filip 1989), or on areas of partial thinning where high stocking levels of Douglas-fir are retained. Infection is more frequent on poor sites with low moisture, and poor fertility than on good sites. Retaining vegetative litter and woody debris helps to control erosion on disturbed sites, provides media for healthy soil fungi, acts as mulch for water retention and conservation of soil nutrients important to tree growth. It is desirable to maintain moderate levels of litter and old and new coarse woody debris (>3" dia.) at ~10-15 tons/acre on the harvest units. Retention of well distributed forest cover provides protection from high solar insolation and can help reduce drought stress to improve conifer regeneration.

Environmental Effects on Soils

No Action Alternative: Direct, Indirect, and Cumulative Effects

Implementation of the no-action alternative would result in no soil resource impacts in the project area. Soil resource conditions would remain similar to those described in the existing conditions of this analysis.

Action Alternative: Direct and Indirect Effects on Soils

Implementation of the action alternative is a combination of salvage harvest of dead, dying and high-risk trees and regeneration harvest to reduce competition and improve growth of diverse tree species that are more resistant to root rot. Approximately 202 acres of harvest are proposed on locations outlined on Soil Maps S-1. Tree planting, grass seeding roads and noxious weed management would also occur. The proposed project could construct 3.3 miles of road and complete repairs and maintenance on up to 10.5 miles of road to meet BMP's. Primary soil concerns with harvest operations are potential for excessive surface disturbance and to a lesser degree, erosion. To maintain soil productivity, and promote conifer regeneration, BMP's and the listed mitigation measures would be implemented to minimize the area and degree of soil effects associated with harvest operations. Implementation of BMP's and the recommended mitigation measures, has been shown to effectively limit detrimental soil impacts to less than 15% of the harvest units based on DNRC soil monitoring on comparable sites (DNRC 2006, 2011) and recent harvest on nearby sites and the estimated area that may be detrimentally impacted is displayed in table S-2.

All new roads are located on stable terrain and would be constructed to meet Best Management Practices. The 3.3 miles of new road construction would change the land use of the added roads to transportation and disturb up to 13.2 acres of land as noted in table S-2. The actual area disturbed varies with road width and extent of temporary roads that would be reclaimed. Proposed roads cross segments of shallow soils and fractured bedrock, and rock raveling is expected that would require periodic maintenance. The high rock/coarse fragment soils are excessively well drained and durable to road traffic with implementation of standard road drainage features. On existing roads, road maintenance and site specific road reconstruction requirements would be implemented to improve road drainage and control erosion. All new roads would be grass seeded with site adapted grass to speed revegetation and control erosion and weeds.

Table S2 – Detrimental Soil Disturbance for the Action Alternative

Area of Analysis	Total Area (Acres)	Disturbance Rate (%)	Estimated Impacted Area (Acres)
Harvest Units (including landings)	120 acres Cable 82 acres Tractor	Cable up to 8% Tractor up to15%	Cable 9.6 Tractor 12.3
Roads 3.3 miles	13.2	< 1% of project parcels	13.2

We expect that by protecting at least ~80% of a harvest area in non-detrimental soil impacts, soil properties important to soil productivity would be maintained, and the projected impacts are below that range. The estimates of existing impacts are approximately 5% and additional

impacts from the proposed operations are expected to add up to 10% = 15% projected. Contract administration would monitor on-going operations to control soil disturbance to avoid excessive impacts and meet silvicultural goals to reduce competition. The improved tree spacing would improve growth of retained trees, due to reduced competition for soil moisture and nutrients, and promoting diverse species more tolerant of root rot, as discussed in the vegetation section.

Considering nutrient cycling, the level of tree mortality has already caused many needles and fine litter to fall to the forest floor. A substantial proportion of plant available nutrients are retained in the forest floor duff and surface mineral soils, and forest duff and litter provide a mulching cover that retains surface moisture. A substantial portion of fine foliage that has not already fallen would be expected to break off during logging operations. The proposed harvest and slash treatments is expected to reduce 15 to 20% of the existing coarse and fine woody debris, based on the planned 50% canopy harvest and retaining a proportion of fine materials. On all proposed harvest areas a portion of old and new course woody debris (CWD >3" dia.) at ~5-10 tons/acre and fine litter (similar to historic ranges) would be retained as noted in attached mitigations..

For all these reasons, there would be low to moderate risk of direct and indirect effects to geology or soil resources as a result of the proposed action.

Cumulative Effects of the Action Alternative on Soil productivity

Cumulative effects to soils can occur from repeated ground skidding entries into the harvest area and additional road construction, depending on the area included. No previous harvest occurred in section 16 and only minor effects occur on proposed harvest areas in sections 15 and 21, thus there is low potential for additive cumulative effects to soils with the proposed actions.

There would be short to mid-term reductions in fine litter on high priority fuels reduction treatment zones near residences and open roads. Cumulatively over the rotation of the forest stands, the combination of fine litter and coarse woody debris would be expected to maintain surface organic matter that provides media for healthy soil fungi and conserves soil nutrients and moisture important to tree growth and supports long term productivity. Improved tree spacing will reduce competition for nutrients and soil moisture, enhance growth of retained trees, and promote regeneration of conifers as noted in the vegetation section.

Section 7 Vegetation, Noxious Weeds Issue

Noxious Weeds – There is a concern that forest management activities may result in introduction of new weeds or increased spread of noxious weeds from the proposed forest management activities.

Regulatory Framework

The following plans, rules, and practices have guided this projects planning and/or will be implemented during project activities:

All applicable weed management requirements of the County Weed Control Act 7-22-2101 to 7-22-2153, Best Management Practices, State Forest Land Management rules and regulations, and measures outlined in the DNRC Habitat Conservation Plan would be implemented. This includes, but is not limited to management rules for classified forest lands ARM 36.11.445 where the department shall use an integrated pest management approach for noxious weed management that includes prevention, education, cultural, biological, and chemical methods as appropriate.

Analysis Methods & Analysis Areas

The methods for disclosing impacts for this analysis include using descriptions of weeds occurring in the area, weed management efforts that have been completed and then qualitatively assess the risk of weed spread based on the proposed actions and mitigations.

Noxious Weeds- Existing Conditions

Noxious weeds occurring in the project parcels are mainly a combination of knapweed (Centaurea maculosa), houndstongue (Cynoglossum officinale L) and spot infestations of toadflax 9. Knapweed was found along roadsides as well as in some forested portions of the project area. Houndstongue was found mostly along roadsides along the access haul routes within project sections and on adjacent lands. Approximately 4 miles of roadside weeds were treated in 2013 along the access route. Spot infestations of Toadflax were noted on a roadside (likely bird introduced) and was treated in 2013 and will be monitored and retreated if needed. Road use, timber harvest activities, grazing, and soil disturbance from fire are most likely the reasons for the existing rate of spread of noxious weeds and the potential future spread and introduction of noxious weeds. The prevailing winds from the Clark Fork valley and lower Blackfoot also carry windblown weed seed throughout this area. Moist sites with well established surface vegetation provide a competitive advantage over noxious weed establishment. Reseeding of some roadcuts followed by roadside, spot herbicide treatments and release of bio-control insects have been made on noxious weeds on portions of all of the project sections and this has helped reduced the spread of noxious weeds. DNRC has completed herbicide treatments along portions of the access road in 2013, yet weeds continue to spread by wind, animals and vehicles. Weed management treatments on adjacent ownerships in the area varies from no-action to combinations of revegetation, herbicide treatments and bio-control measures.

Environmental Effects on Noxious Weeds

No-Action Alternative: Direct, Indirect, and Cumulative Effects on Noxious Weeds

With no action, noxious weeds will continue to spread along roads and may increase on the drier site habitats. Limited weed control efforts on access roads across multiple ownerships in the area, increases the potential for windblown seed. Following disturbance events such as fires, or grazing, the establishment and spread of noxious weeds can be more prevalent than in undisturbed areas. DNRC would continue to treat selected sites on DNRC roads based on priorities and funding availability, but the levels of weed control treatments would be lower than with the action alternative. If new weed invader species are found they would have highest priority for management. On state land parcels the grazing licensees would be required to continue weed control efforts consistent with their use.
Cumulative effects of noxious weeds within the project areas are moderate. Weeds have spread across ownerships over time by multiple uses from wind, fire, traffic, forest management, wildlife and grazing animals. As tree density and ground cover vegetation increase over time, weeds are reduced through vegetative competition.

Action Alternative: Direct, Indirect, and Cumulative Effects on Noxious Weeds

Implementation of the action alternative will involve ground-disturbing activities that have the potential to introduce or spread noxious weeds in susceptible habitat types. For the action alternative, an Integrated Weed Management (IWM) approach was considered for treatment of existing and prevention of potential noxious weeds. For this project: prevention, revegetation of new roads and weed control measures on existing roads are considered the most effective

weed management treatments. Prevention measures would require clean off-road equipment. Roadsides would be sprayed prior to operations and weed control and revegetation would slow noxious weed spread and reduce weed density and occurrence compared to no-action. There would be a similar or potential slight increase in weed infestation within harvest units due to soil disturbance and reduction of tree canopy. The silvicultural prescriptions are designed to control disturbance and scarification to goals need for sustained forest growth. Noxious weeds control efforts will promote rapid revegetation and emphasize treatment of any new noxious weeds found.

Herbicide application would be completed on segments of DNRC roads along the haul route, to reduce weed spread along roads and promote desired vegetation for weed competition and to reduce sedimentation. Herbicide would be applied according to labeled directions, laws and rules, and would be applied with adequate buffers to prevent herbicide runoff to surface water resources. Implementation of IWM measures listed in the mitigations are expected to reduce existing weeds, limit the possible spread of weeds, and improve current conditions, to promote existing native vegetation. More weed control would occur compared to the no-action alternative and grass and competitive vegetation would increase along roads.

Overall cumulative effects of increased noxious weeds within the project area, are expected to be moderate, based on herbicide treatments of existing weeds along roads and implementing prevention measures to reduce new weeds, by cleaning equipment and planting grass on roads to compete against weeds. The combined efforts of weed control across ownerships continues to improve through cooperative efforts with the Missoula County Weed District and local weed control interest groups including the Blackfoot Challenge.

Soils and Noxious Weed Mitigations

The analysis and levels of effects to Soil resources with the Action Alternative are based on implementation of the following mitigation measures.

* DNRC would implement all applicable BMP's, Montana Administrative Rules for Forest Management, and reasonable mitigation and erosion control practices during timber harvest, road maintenance, and road construction and road use activities. The commitments of the DNRC Habitat Conservation Plan (HCP) would be implemented on the applicable parcels.

* Limit harvest equipment and hauling operations to periods when soils are relatively dry, (less than 20%), frozen or snow covered to minimize soil compaction and rutting, and maintain drainage features. Check soil moisture conditions prior to equipment start-up.

* On tractor harvest units the logger and sale administrator will agree to a general skidding plan prior to equipment operations to limit trails to 15% or less of the harvest unit. Feller-bunchers may work on slopes up to 45% as long as displacement and turning is minimized to prevent excessive disturbance. Slopes over 45% would be cable harvested to reduce soil impacts and improve harvest efficiency.

* Whole tree skidding can reduce slash hazard, but also remove a portion of nutrients from growing sites. Target fine slash and woody debris levels are to retain 5-15 tons/acre well distributed on site while meeting the requirements of the slash law. On sites with lower basal area, retain large woody debris as feasible since it may not be possible to retain 5 tons/acre and the emphasis will be on providing additional CWD in the future. Slash may be placed on main skid trails to protect soils and reduce erosion potential.

* Existing road segments would be improved and maintained in association with the harvest activities. Road improvements would include surface blading and installation of drainage features to control surface erosion and prevent sediment delivery to streams as needed to comply with BMP'S, and to protect water quality.

* Harvest operations and road conditions would be monitored as part of the on-going project operations and repairs would be made as needed, including erosion control, culvert cleaning and re-vegetation. If cut-slope or fill-slope slumps occurred on new roads they would be stabilized to control erosion as part of the harvest project.

* New road construction, including drainage features should be completed in the prior to freeze-up. Road cutslopes are to be constructed at relatively stable angles as noted in contract.

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ATTACHMENT C

Heyers Gulch Timber Sale – Water & Fisheries Resources Analysis

Analysis Prepared By: Jeff Collins, Hydrologist/Soil Scientist, DNRC, 2/18/14

Introduction

The following analysis will disclose anticipated effects to water and fishery resources within the Heyers Gulch project area. The sections on issues & concerns, regulations and mitigations have been combined for water and fishery resources. Direct, indirect, and cumulative effects to water and fisheries resources of both the No-Action and Action alternatives will be analyzed.

Water & Fisheries Resources Issues

The following issue statements were developed from internal and public scoping regarding the effects of the proposed timber harvest and road systems to water resources, fisheries, soils and noxious weeds. For specific comments and concerns, refer to the project file.

* Water Quality - There is a concern that the proposed action may cause impacts to water quality and quantity from timber management, road construction and road use.
* Cumulative Watershed Effects- There is a concern that the proposed timber harvest may cause or contribute to cumulative watershed impacts as a result of potential increased runoff and sedimentation.
* Cold Water Fisheries- There is a concern the proposed forest management actions may have effects to fisheries due to sedimentation.

Regulations, Laws, Rules & Agreements that Apply to Water & Fisheries Resources

The following plans, rules, and practices have guided this projects planning and/or will be implemented during project activities:

Montana Surface Water Quality Regulations

The Blackfoot River and its tributary streams in the project analysis areas are classified as B-1 in the Montana Surface Water Quality Standards (ARM 17.30.623). The water quality standards for protecting beneficial uses in B-1 classified watersheds are described in ARM 17.30.623. The B-1 classification is for multiple use waters suitable for; domestic use after conventional treatment, growth and propagation of cold-water fisheries, associated aquatic life and wildlife, agricultural, and industrial uses. Other criteria for B-1 waters include; no increases are allowed above naturally occurring concentrations of sediment, which will prove detrimental to fish or wildlife and a maximum 1 degree Fahrenheit increase above naturally occurring water temperature is allowed within the range of 32 to 66 degrees Fahrenheit.

Naturally occurring includes conditions or materials present from runoff or percolation on developed land, where all reasonable land, soil, and water conservation practices have been applied. Reasonable conservation practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses. The State has adopted Forestry Best Management Practices BMP's through its Non-point Source Management Plan as the principle means of controlling non-point source pollution from silvicultural activities. Stream temperatures are discussed in the fisheries section. DNRC provides further protection of water quality and sensitive fish through implementation of the Streamside Management Zone (SMZ) Laws and Forest Management Rules.

Water Quality Limited Waterbodies and Beneficial Uses

Heyers Gulch, St. Lawrence Creek and Bear Creek are not listed as impaired on the State's 303(d) list of impaired bodies of water (MTDEQ 2012). The main stem of the Lower Blackfoot River MT 76F001-33 is listed as water quality impaired for aquatic life. The probable cause of impairment on the lower Blackfoot River is elevated levels of ammonia (un-ionized). The

probable sources listed are silviculture, grazing in the riparian or shoreline and contaminated sediments. There is very limited grazing in the lower Blackfoot River canyon reach and another contributor is Union Creek, upstream. There are grazing effects in lower Bear Creek that would not be changes by use of the existing road.
Beneficial Uses- Downstream beneficial uses include aquatic life, drinking water, recreation, agriculture and industry. There are no water rights on the DNRC parcels proposed for harvest. There is an irrigation diversion and pond on private land in lower St. Lawrence Creek.

Montana Streamside Management Zone (SMZ) Law

All rules and regulations pertaining to the SMZ Law will be followed. An SMZ width of 100 feet is required on Class I and II streams when the slope is greater than 35%. As stated in SMZ ARM 36.11.302(ii), where the slope of the SMZ decreases to 15% or less to form a bench that is 50 to100 ft. from the ordinary high water mark and at least 30 ft. wide, the SMZ boundary is located at the edge of the bench nearest the stream. An SMZ width of 50 feet is required when the slope is less than 35%. There is only one SMZ harvest boundary in the project area that is adjacent to a segment of class 3 stream within the SW ¼ of Section 16 T13N, R17W.

DNRC Forest Management Rules and Habitat Conservation Plan

All applicable State Forest Land Management rules and regulations regarding watershed and fisheries management will be followed. This includes, but is not limited to rules listed for water quality (ARM 36.11.422), cumulative effects (36.11.423) Riparian Management Zones RMZ (ARM 36.11.425), Fisheries (ARM 36.11.427) and Conservation Strategies outlined in the DNRC Habitat Conservation Plan (HCP 2011) where applicable. As part of ARM 36.11.427(3)(a)(i) and (iv) and ARM 36.11.436, DNRC is committed to designing forest management activities to protect and maintain bull trout, westslope cutthroat trout and all other sensitive fish and aquatic species as noted in the fisheries assessment. The lower Blackfoot River and its tributary Heyers Gulch and likely St. Lawrence Creek are Class 1 fish bearing streams. No actions are proposed within 1 mile of the Blackfoot River, and no actions are proposed near perennial segments of St. Lawrence Creek. The HCP requires no-harvest within 50 feet of a class 1 fisheries stream and the proposed harvest boundary of no-harvest within RMZ of Heyers Gulch provides an even wider buffer of protection, than required for minimum effective protection as determined in the HCP analysis.

Water Resources Analysis Methods and Areas

A watershed analysis and field survey was completed by a DNRC hydrologist for the proposed project to determine direct, indirect and cumulative effects to water quality. The water quality evaluation included a review of existing inventories for water resources (NRIS 2013), road inventories, reference to previous DNRC projects, and comparisons of aerial photos combined with GIS analysis to estimate the area of past timber harvest and vegetative recovery. Several field reviews were completed for the proposed harvest units, condition of access roads and associated streams and the observations, information and data were integrated into the watershed analysis and design of project mitigations.

Sediment delivery

The analysis areas for sediment delivery are limited to the harvest units and roads used for hauling and will focus on the streams described as affected watersheds. Refer to the hydrology map WS-1 for analysis areas that encompass the proposed harvest units and road haul routes. A road inventory was completed for sediment sources and to design mitigation measures. The analysis includes in-channel and upland sources of sediment that could result from this project. In-channel areas include the stream channels adjacent to and directly downstream of harvest areas. Upland sources include harvest units and roads that may contribute sediment delivery as a result of this project. The measurement criteria for this sediment analysis are 1) miles of new road construction and road improvements and 2) potential for sediment delivery to streams.

Water Yield

Cumulative watershed effects can be characterized as impacts on water quality and quantity that result from the interaction of past, current or foreseeable future disturbances, both natural (fire) and human-caused. Past, current, and future planned activities have been taken into account for the cumulative effects analysis.

The analysis for cumulative effects to water yield considers the area of harvest units and access roads within the project drainages described as the affected watersheds. A DNRC hydrologist completed a coarse filter qualitative assessment of watershed conditions and cumulative effects as outlined in the Forest Management Rules (ARM 36.11.423) and the commitments described in the HCP concerning watershed management. Based on extensive past logging in the area, a more detailed assessment of sediment sources and stream channel conditions was also completed. The measurement criteria for the water yield analysis are the potential for increases to surface runoff water yield and affects to stream flow.

The analysis areas for watershed cumulative effects include the watersheds that wholly surround the DNRC project sections and the access roads to those sections. Past, current, and future planned activities have been taken into account for the cumulative effects analysis.

Affected Watersheds

The proposed harvest areas are located within parts of Montana school trust Sections 15, 16 & 21 T13N, R17W approximately 5 air miles east of Bonner, Montana and 8 air miles west of Potomac, Montana (refer to Heyers Gulch Watershed Map WS-1). The State of Montana Trust Lands owns the majority of the project area from the recent acquisition of adjacent historically owned Plum Creek Timberlands. The analysis area supports a mixed forest of lodgepole pine, Douglas-fir, ponderosa pine, and western larch. The proposed harvest units are located along a ridge line that includes 116 acres of harvest in the Blackfoot River-Twin Creek 6th HUC 170102031307 (22,459 acres in size) and 86 acres of harvest in the Blackfoot River-Johnson Gulch 6th HUC 170102031308 (16,939 acres in size). Initially for the purposes of this analysis the project area was further divided into 4 sub-drainage areas that were designated Heyers Gulch, St. Lawrence Creek, Bear Creek and Blackfoot Face drainage, a small unnamed 1st order tributary face drainage of the Blackfoot River.

Bear Creek and Heyers Gulch are located on the south half of the Blackfoot River-Twin Creek 6th HUC 170102031307. Forest operations in the Bear Creek drainage are limited to use of the existing access road. Bear Creek is a Class 1 tributary to the Blackfoot River and 5253 acres in size and has an average yearly precipitation of 21”/year.

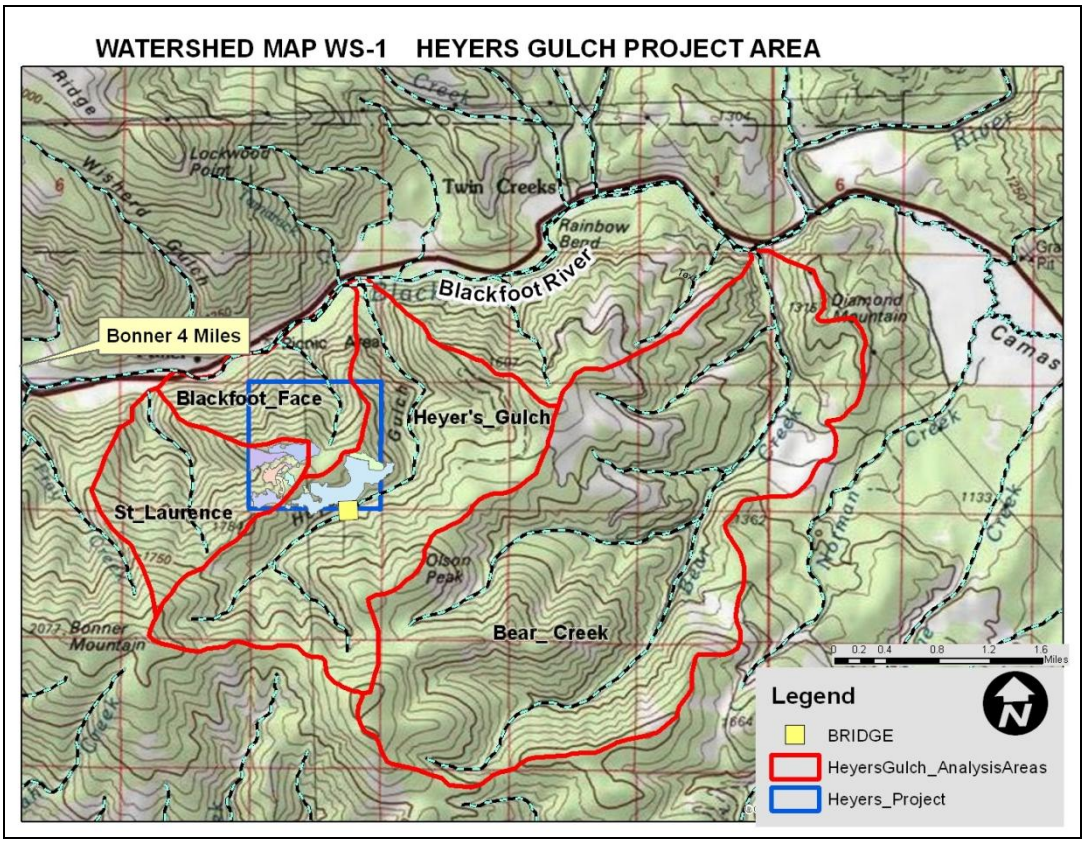
Heyers Gulch is a 3.8 mile, 2rd order perennial Class 1 tributary to the Blackfoot River. Heyers Gulch is 2460 acres in size and has a moderate precipitation of 24”/year that is mainly snowfall in this sub-drainage.

St Lawrence Creek and the Blackfoot Face sub-drainages are part of the larger Blackfoot River-Johnson Gulch 6th HUC 170102031308 (16,939 acres in size). St. Lawrence Creek is a small 917 acre, 2nd order perennial tributary of the Blackfoot River. Average yearly precipitation is 27”/year for this small sub-drainage. The Blackfoot Face drainage is a small 917 acre Class 2 first order tributary that has seasonal flow to the Blackfoot River.

State Trust Land Areas Dismissed from Further Analysis

The proposed harvest units located within a sub-drainage labeled Blackfoot Face, in Section 16, T13N, R17W, State trust land parcel is dismissed from further water resource and fisheries analysis based on the following. The proposed harvest is located on a ridgeline within this small 917 acre face drainage of the Blackfoot River (refer to Blackfoot Face Drainage on map WS-1). The proposed small area of harvest of up to 21 acres and road construction would not have a measurable effect on water quality or increased runoff to the lower Blackfoot River. The

proposed harvest area is over 1 mile from the river, where no disturbance would occur, and there are no surface waters or drainage features in the proposed harvest area, or on the access road to this unit. All resource mitigations would be applied and there is low potential for any direct, indirect or cumulative impacts to off-site runoff, sediment delivery or water quality from this small area.



Existing Conditions- Water Resources & Water Quality

Past management activities in the project area include timber harvest, road construction, fire suppression, grazing, and recreation. Streams in the project area were reviewed for channel stability and sediment sources. Heyers Gulch, Bear Gulch and St. Lawrence Creek are Class 1 perennial streams. Overall water quality in the analysis area drainages are considered good, based on sediment surveys and recent stream channel stability assessments.

Past management activities in the watersheds include, timber harvest, road construction, fire suppression and minor grazing (mainly on lower roads in Bear Creek) due to the steep rocky terrain. The timber stands are dominated by mixed conifer forests that were largely initiated by fires. Historic harvests were extensive in the area from 1960-2005, during the previous corporate ownership. Some impacts may have occurred on adjacent lands associated with logging and road use practices in the prior to BMP adoption in 1988.

Sediments

The proposed haul route from Highway 200 near Potomac, would utilize 12.5 miles of existing paved, graveled and native surface roads, beginning on the Bear Creek Road. The Bear Creek access road has one major crossing in section 13, T13N, R17W that was recently replaced by DNRC with a bridge. The Bear Creek access roads mainly meet BMPs, with the exception of

several segments of road that require maintenance grading and repairs of road surface drainage features.
There are 26 crossings of combined streams, and draws with ephemeral flow within the Heyers Gulch drainage. A 2009 road inventory found that 24 sites meet BMP's for effective drainage. Field reviews for this project noted five crossing sites (2 perennial, 3 intermittent) along the haul route that required maintenance and repairs to fully meet BMP's, including the need for rock armoring of culvert inlets and repairs or maintenance grading of road surface drainage features. There is an existing railroad car bridge in the NW corner of section 21, T13N, R17W (built1992) that is not on the haul route but may be used for walk in access. The bridge cannot support heavy truck traffic.
Private lands on St. Lawrence Creek were not reviewed, but ground conditions were reviewed at the top of drainage on DNRC Section 16, T13N, R17W, and at the mouth of the stream. St. Lawrence Creek is partially diverted to a private pond for irrigation, and the main-stem flow to the Blackfoot River is very minor or dewatered in late summer. St. Lawrence Creek is confined to a narrow, relatively stable channel that delivers to a 24" culvert that runs under HWY 200 and is a barrier to fish passage.

Water Yield

DNRC estimated the water yield within the Heyers Gulch and St. Lawrence Creek drainages as they may be affected by increased harvest, using the Equivalent Clear-cut Acres (ECA) method as outlined in Forest Hydrology part 2 (Haupt et al. 1976). ECA analysis estimates the water yield increase based on the amount of vegetative cover from natural disturbance such as fire and mortality or from timber harvest, roads or land clearing (refer to table WS-1). ECA is a function of precipitation, total area roaded and harvested, % crown cover removal in harvest areas and the amount of vegetative recovery that has occurred in the harvest areas. Increases in water yield over total forested conditions can affect stream channel stability, depending on the stream morphology.
The area of past timber harvests, insect mortality and fires in the analysis drainages indicated a concern for increased water yield. There has been extensive harvest within the project drainages, largely from 1960 to 2005 on corporate timberlands that have recently been acquired as Montana state trust lands. Previously harvested sites have partially regenerated to conifers and recovered some water yield increases.

Table WS-1 Estimated Existing Annual Water Yield Increase for Analysis Area

Analysis Area	Drainage Average PPT	Estimated Acre Feet Runoff	Allowable Water Yield Increase	Existing Water Yield Increase
Heyers Gulch 2460 acres	AVG 24" / year	1274 acres feet	15%	16.7
St Lawrence Creek 917 acres	AVG 26" / year	689 acre feet	15%	13.7

For this project DNRC determined (per ARM 36.11.423) there was a high relative threshold for increased water yield, of 15%, due to the rocky and resilient parent materials and moderate precipitation. In Heyers Gulch the existing water yield of 16.7% (refer to table WS-1) is estimated to be over the concern threshold of 15% and prompted review of stream channel conditions below the proposed harvest area.
Stream channel stability ratings were completed on the main stem of Heyers Gulch, using the USFS Stream Reach Inventory and Channel Stability Evaluation Procedure (Pfankuch, 1978) and the evaluation was good for the rocky channel in 2013. The A2 and B2 channel types have been ranked as having very low sensitivity to disturbance, sediment supply, streambank erosion

potential and exhibit excellent recovery potential (Rosgen 1994). Past riparian harvest and increased water yields from previous harvest have had low to moderate channel effects in portions of Heyers Gulch, yet channel morphology is rated as good and stable with extensive vegetation growth along channels. The channel near the bridge location in NE section Section 15, T13N, R17W is well vegetated and an almost impenetrable mass of aspen, dogwood and willows with stable channel conditions.

The St. Lawrence Creek drainage is small and the estimated water yield was below the 15% threshold level. The calculations considered increased mortality from root rot and insects.

Existing Watershed Cumulative Effects

Heyers Gulch, St. Lawrence Creek and Bear Creek are not 303d listed impaired streams and all beneficial uses are currently supported, including fish and aquatic life. Yet there are cumulative effects to water quality within the project drainages that include, timber harvest, extensive roads, some on poor road locations and crossing sites, an irrigation diversion of flow in lower St. Lawrence Creek. An initial Coarse Filter Watershed effects assessment lead to more detailed fine filter assessments, including a road inventory for sediment sources, a water yield calculation and stream channel stability rating downslope of the proposed harvest to assess cumulative watershed effects on stream channel conditions and water quality.

Sediment sources of concern are primarily at stream crossing sites and road segments adjacent to stream channels. In spite of the extensive roads and previous harvests, sediment and surface erosion rates are generally low due to the very gravelly and coarse, stable nature of the soils derived from Belt bedrocks. Within the project area, tree mortality and reduced growth has occurred due to root rot, Douglas fir beetle, pine beetles attacks and spruce bud worm defoliation. Where root rot occurs Douglas-fir are in decline, dead or at risk of mortality. Mortality loss of trees would have an effect on changes in available water, evapo-transpiration, but would be considered to be within the range of natural conditions and have a expected to have a minor change to water yield. Stream ratings were found to have good stream channel stability downstream of the project, and water yield had low-moderate impact on channel stability on these reaches.

Environmental Effects

No Action Alternative: Direct, Indirect, and Cumulative Effects

Implementation of the no-action alternative would result in no water resource impacts in the project area. Water quality would remain similar to those described in the existing conditions sections of this environmental assessment.

Action Alternative: Direct, Indirect, and Cumulative Effects

Implementation of the action alternative is a combination of salvage harvest of dead, dying and high-risk trees to reduce competition, promote regeneration of diverse conifer species more tolerant of root rot and improve tree growth. Approximately 202 acres would be harvested using a combination of 80 acres cable logging and 122 acres ground based skidding. Approximately 3.3 miles of new road would be constructed and 10.5 miles of road would be maintained and improved to meet BMP's and control sedimentation.

Sediments

As noted in the soils resource analysis, there is low potential for off-site erosion from the harvest areas based on the high rock content soils, rapid water infiltration rates that exceed most runoff and use of cable harvest practices on steeper sideslopes that limit disturbance. No harvest would occur within the riparian areas of Heyers Gulch or St. Lawrence Creek in order to maintain effective buffers to any potential sediment. A Streamside Management Zone would be marked and maintained along a short, Class 3 stream segment near the ridge of the St. Lawrence drainage. This intermittent channel has very short duration flow in the spring and

does not appear to have connectivity downslope, but will be protected as an added precaution, and no harvest is proposed in the SMZ.
All of the proposed roads are located on dry stable sites and would be constructed to meet BMP's on dry sites with one ephemeral draw crossing. The high rock/coarse fragment soils are excessively well drained and durable to road traffic with implementation of standard road drainage features. No new stream crossings are proposed. All new roads would be grass seeded with site adapted grass to speed revegetation and control erosion and weeds.
On the existing haul roads, about 10.5 miles of road maintenance and site specific road reconstruction requirements would be implemented to improve road drainage and control erosion. Road grading would have a short term increase in dispersed road surface erosion that would decline the second year by 70 to 80%.The only operations in the Bear Creek drainage would be use and maintenance of the haul road. On the haul route, road surface drainage improvements and additional rock armor and sediment control at crossings would reduce current sediments on two perennial stream crossings and intermittent stream crossings in the Heyers Gulch drainage. No drainage crossing would be used in St. Lawrence Creek drainage. Overall there would be reductions in site specific sediment sources, with short duration direct effect of low sediments from road repairs and an overall low to moderate risk direct and in-direct downstream effects on water quality in these resilient streams.

Water Yield

Heyers Gulch is 2640 acres in size and has moderate precipitation with an average of 24"/year; water infiltration is rapid in these rocky and well drained soils. The combination of root diseases and insect mortality are leading to declining forest cover and vigor as noted in the vegetation analysis, and the reduced canopy would be expected to increase in runoff. The proposed harvest in Heyers Gulch is 116 acres of salvage and regeneration harvest where 50% mortality is expected and the potential increase of water yield would be less than 1%, and not measurable and very unlikely to have a perceptible effect on stream channel stability or channel forms in Heyers Gulch .

St Lawrence Creek is 917 acres in size and has moderate precipitation with an average of 27"/year; water infiltration is rapid in these rocky and well drained soils. The proposed harvest in St. Lawrence Creek is 64 acres of salvage and regeneration harvest where 30% or greater mortality is expected from the combination of root rots and insects. The potential increase of water yield would be less than 1% and not measurable and very unlikely to be perceptible on the ephemeral channel below the harvest area or further downslope to the stream channel stability or channel forms in St. Lawrence Creek. For all these reasons, there would be low risk of direct and indirect effects to water quantity and water resources as a result of the proposed action.

Cumulative effects

There is low risk of additive cumulative effect to water quality or water yield for the proposed alternative based on no riparian harvest in Heyers Gulch, repair and stabilization of sediment sources, minor estimated water yield increases, stable parent material of high rock contents, and stable, resilient stream channel morphology.
In both Heyers Gulch and St. Lawrence Creek, over time the expected improved growth of retained trees and regeneration of more disease tolerant trees should improve stand cover and vigor and moderate any water yield effects.

Fisheries Analysis Methods and Areas

This analysis will consider the presence of fish and potential effects of sedimentation on fisheries resources. The analysis will tier to the regulations, guidelines and methods outlined in the Water Resources Analysis of this report.

No harvest operations would occur within the riparian management zone of Heyers Gulch or within an ephemeral SMZ of St. Lawrence Creek. There would be no affect on large woody debris, or stream shading that could affect temperatures and thus large woody debris and shading variables will be dismissed from further analysis.
The cumulative effects analysis area for sediment delivery is limited to the proposed harvest units and roads used for hauling as displayed in the water resources analysis. This includes in-channel and upland sources of sediment that could result from the project.

Existing Conditions- Fisheries

Bear Gulch is a known fishery stream supporting westslope cutthroat trout and other minor species. The Bear Gulch drainage would only be affected by use of the existing main access road route as no harvest is proposed in this drainage. The access road system is closed in part to reduce traffic maintenance for the roads and road damage has been minimal. The road system is extensive in the project drainages and generally high gravel/rock content and road surface drainage (drain-dips) is effective and not delivering much sediment. The main access road uses one crossing of Bear Gulch in the SE ¼ of Section 13, T 13N, R17W. The crossing site was recently replaced with a bridge and meets all BMP's and does not affect fish connectivity. The project drainages are steep and rocky and not measurably affected by livestock grazing, except for possibly private lands in lower Bear Creek.

Heyers Gulch, Bear Gulch and Lawrence Creek are Class 1 streams. No fisheries data is available for St. Lawrence Creek or Heyers Gulch. For the purposes of this analysis we will consider these streams fish bearing and likely supporting westslope cutthroat trout. Westslope cutthroat trout is a sensitive species. There are no indications that the small streams in the analysis area can support Bull trout.

Heyers Gulch and St. Lawrence Creek are narrow, steep gradient Rosgen A2 and B2 type streams with stable channels that are generally low sediment contributing streams. Heyers Gulch is a 3.75 mile 2nd order stream and has 3 stream crossings on the main-stem and stream crossings on tributary channels. The crossing sites have adequate road surface drainage, but several culverts have minor sediments from road fills at culvert sites where additional rock armor is required. There is an existing railroad car bridge in the NE ¼ of Section 21, T13N, R17W that is not proposed for use, but may provide walk in, administrative access to the lower boundary of several harvest units. This bridge cannot currently support heavy logging traffic. The bridge does not affect fish connectivity, and is a very minor sediment source.

The conditions of road crossings in St. Lawrence Creek are unknown, and part of the stream flow is diverted to a private pond for irrigation. Near the mouth of St. Lawrence Creek, the Highway 200 crossing is relatively stable, but is a partial barrier to fish connectivity from the Blackfoot River.

Fishery Resources - Environmental Effects

No Action Alternative: Direct, Indirect, and Cumulative Effects

Implementation of the no-action alternative would result in no fisheries resource impacts in the project area. Fisheries condition would remain similar to those described in the existing conditions sections of this environmental assessment.

Action Alternative: Direct, Indirect, and Cumulative Effects

Implementation of the action alternative is a combination of improvement and salvage harvest of dead, dying and high-risk trees and thinning to reduce competition and improve growth of

diverse tree species. The proposed harvest is low to moderate intensity, selection harvest of 202 acres. The proposed harvest above Heyers Gulch is upslope of an existing road and over 125 feet from Heyers Gulch at the nearest point, which is outside of the SMZ and RMZ for Heyers Gulch.

Approximately 3.3 miles of new road would be constructed on dry sites with no new stream crossings. On existing roads, road maintenance, site specific road reconstruction requirements and all BMP's would be implemented to improve road drainage and control erosion. Road maintenance and repairs would likely result in short duration, low levels of sedimentation that would quickly subside. All new roads would be grass seeded with site adapted grass to speed revegetation and control erosion and sedimentation.

In the event that road infrastructure funds become available, the existing steel railroad car bridge in NW section 21 T13N, R17W would be replaced with a new steel bridge of longer span, at the same location. The proposed timber sale cannot adequately fund replacement the bridge. If the bridge is replaced, all operations would meet BMP's for site specific erosion control and any requirements of a FWP 124 permit for the crossing replacement. The bridge replacement would likely result in a short term, direct impact to sediment, during construction based on comparison to previous crossing replacements. The possible bridge replacement would also result in a long term minor reduction in existing sediments and no measurable change in in-direct or cumulative effects.

The proposed project has overall low potential for direct, indirect or cumulative impacts to fisheries based on the following: no harvest adjacent to Class 1 fishery stream, stream channel conditions are stable and resilient, short duration minor sediments form road repairs, moderate harvest away from streams, planned road repairs and maintenance to reduce sediment, road construction on dry sites with no new stream crossings, implementation of BMP's, applicable rules and attached mitigations.

Water & Fishery Resource Mitigations

The analysis and levels of effects to Water and Fishery resources are based on implementation of the following mitigation measures.

* DNRC would implement all applicable Best Management Practices (BMP's), Montana Administrative Rules for Forest Management, and reasonable mitigation and erosion control p-ractices during timber harvest, road maintenance, and road construction and road use activities. The commitments of the DNRC Habitat Conservation Plan (HCP) would be implemented on the applicable parcels.

* DNRC would locate, clearly mark and maintain suitable water resource protection boundaries including Streamside Management Zones (SMZ's) and Wetland Management Zones (WMZ's) adjacent to streams and wetlands consistent with State Forest Land Management Rules. An SMZ boundary would be located along an unnamed intermittent tributary of St Lawrence Creek in Section 16, T13N, R17W.

*Mitigations to reduce soil impacts and control erosion on skid trails and cable corridors would be implemented to protect water quality including limiting harvest and hauling operations to periods when soils are relatively dry, (less than 20%), frozen or snow covered to minimize soil compaction and rutting, and maintain drainage features.

* Existing and new roads would be maintained concurrently in association with the harvest and road use activities. Road improvements would include surface blading, rock armor culvert inlets, and installation of road drainage features to prevent surface erosion and sediment delivery to streams as needed to comply with BMP'S, and to protect water quality.

* If the bridge in the NE corner of section 21 is replaced, the bridge construction would be completed in accordance with all BMP's and FWP 124 permit requirements.

* New road construction, including drainage features should be completed in the summer or fall prior to freeze-up or periods of expected high rainfall.

* All newly disturbed soils on road cuts and fills would be promptly reseeded to site adapted grasses to reduce erosion/sediment from roads.

Water & Fishery References

MT DNRC , Environmental Assessments of past DNRC timber sales and road projects including; McNamera T.S., Washoe T.S., Kamas Point T.S. , Greenough, Ashby & Bear Creek Road projects, and minor salvage permits, Missoula Unit, Southwestern Land Office.

MT DNRC. 2003 Montana Administrative Rules for Forest Management on DNRC Forested Lands. Montana DNRC. Trust Lands Management Division. Helena, MT.

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MT DNRC. 2010. DNRC Habitat Conservation Plan, Final EIS Forest Management Bureau Division, Missoula, Montana.

MT DNRC, 2011. Best Management Practices for forestry in Montana. Available online at www.dnrc.mt.gov/forestry/assistance/practices/documents/bmp.pdf; Last accessed August 3, 2012.

NRIS, Montana Natural Resources Information System, Internet database search for water, water rights, and fisheries, 2012. http://nris.state.mt.us/interactive.html

Attachment D
Heyer's Gulch Timber Sale – Wildlife Analysis

Analysis Prepared By: Garrett Schairer, Wildlife Biologist, SWLO, Montana DNRC

Introduction
The following sections disclose the anticipated direct, indirect, and cumulative effects to wildlife resources from the proposed action in the project area and cumulative-effects analysis areas described for each resource category. Past and ongoing activities on all ownerships, as well as planned future agency actions, have been taken into account in each cumulative-effects analysis for each resource topic.

Issues:

1. There is concern that the proposed activities could alter **mature forested habitats and/or landscape connectivity**, which could affect species that rely on these mature forested habitats, and/or alter connectivity and the ability of wildlife requiring corridors to move through the landscape.

2. There is concern that the proposed activities could alter cover, reduce secure areas, and increase access, which could affect **grizzly bears** by displacing them from important habitats and/or increasing risk to bears of human-caused mortality.

3. There is concern that the proposed activities could negatively affect **Canada lynx** by altering lynx summer foraging habitat, winter foraging habitat, and other suitable habitat, rendering these habitats unsuitable for supporting lynx.

4. There is concern that the proposed activities could reduce the amount and/or quality of **fisher** habitats, which could alter fisher use of the area.

5. There is concern that the proposed activities may alter **flammulated owl** habitat by reducing canopy closure and increasing tree spacing, and could remove snags needed by flammulated owls for nesting.

6. There is concern that the proposed activities could reduce suitable nesting and foraging habitat for **pileated woodpeckers**, which could alter pileated woodpecker use of the area.

7. There is concern that the proposed activities could reduce **security habitat and seasonal cover for moose, elk, white-tailed deer, and mule deer**, resulting in reduced numbers and/or their displacement from the area.

Regulatory Framework
Various legal documents dictate or recommend management direction for terrestrial wildlife species and their habitats on state trust lands. The documents most pertinent to this project include DNRC Forest Management Rules, the Endangered Species Act, the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act.

Analysis Areas
The discussions of existing conditions and environmental effects within each subsection pertain to land areas of 2 different scales. The first scale of analysis is the Project Area (649 acres), which includes section 16 and minor portions of Sections 15 and 21; T13N, R17W of DNRC-managed lands where activities are being proposed. The second scale is the cumulative-effects analysis area, which refers to a broader surrounding landscape useful for assessing cumulative effects to wildlife and habitat. For this proposed project, two distinct cumulative-effects analysis areas were identified. The first cumulative effects analysis area includes the project area and those lands within 1 mile of the project area (5,217 acres). This area is largely managed by DNRC (3,228 acres; 62%); the other land owners/managers in

the vicinity include private (1,236 acres; 24%), The Nature Conservancy (626 acres; 12%), BLM (125 acres; 2%), and MTFWP (2 acres; <1%). The second cumulative effects analysis area is approximately 44,442 acres and includes the area bounded by the Blackfoot River, Union Creek, Ashby Creek, Arkansas Creek, Dirty Ike Creek, and the Clark Fork River. DNRC manages a sizable portion (17,763 acres; 40%) of the cumulative effects analysis area; the other major land holders in the cumulative effects analysis area include The Nature Conservancy (29%) and small private (31%).

Analysis Methods

Analysis methods are based on DNRC State Forest Land Management Rules, which are designed to promote biodiversity. The primary basis for this analysis includes information obtained by: field visits, review of scientific literature, Montana Natural Heritage Program (MNHP) data queries, DNRC Stand Level Inventory (SLI) data analysis, aerial photograph analysis, and consultation with professionals. In the fine-filter analysis, individual species of concern are evaluated. These species include wildlife species federally listed under the Endangered Species Act, species listed as sensitive by DNRC, and species managed as big game by the Montana Dept. of Fish Wildlife and Parks (DFWP).

Coarse Filter Wildlife Analysis:

Issue

There is concern that the proposed activities could alter mature forested habitats and/or landscape connectivity, which could affect species that rely on these mature forested habitats, and/or alter connectivity and the ability of wildlife requiring corridors to move through the landscape.

Introduction

A variety of wildlife species rely on mature to old stands for some or all life requirements. A partial list of these species includes pileated woodpeckers (*Dryocopus pileatus)*, American marten (*Martes americana*), brown creepers (*Certhia americana)*, and winter wrens (*Troglodytes troglodytes*). Wildlife species that require connectivity of forest habitat types between patches, or those species that are dependent upon interior forest conditions, can be sensitive to the amount and spatial configuration of appropriate habitats. Some species are adapted to thrive near patch edges, while others are adversely affected by the presence of edge, or the other animals that prosper in edge habitats. Connectivity of forested habitats facilitates movements of those species that avoid non-forested areas and other openings; connectivity under historical fire regimes likely remained relatively high as fire differentially burned various habitats across the landscape.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on a 44,442-acre area described above in the Analysis Areas portion of this analysis. This scale of analysis would be large enough to support a diversity of species that use mature forested habitats and/or require connected forested habitats.

Affected Environment

The project area currently contains approximately 631 acres (98% of project area) of mature stands (100-plus years in age) of primarily Douglas-fir stands that have a reasonably closed canopy. Currently, forested areas cover most of the project area, facilitating some use by those species requiring connected-forested conditions and/or forested-interior habitats. On the DNRC-managed portions of the cumulative effects analysis area, roughly 2,025 acres (11%) of mature Douglas-fir and western larch habitats exist that have a reasonably closed (>40%) canopy. A portion of the 479 acres (24% non-DNRC lands) of reasonably closed forested habitats and some of the 488 acres of moderately stocked forested stands (25% non-DNRC lands) on other ownerships in the cumulative effects analysis area are likely also providing habitat for those species requiring mature, forested habitats and or forested connectivity. Conversely, much of the 1,002 acres (51% of non-DNRC lands) of shrubs, herbaceous areas, poorly stocked forested stands, and recently harvested stands on other ownerships in the cumulative effects analysis area is likely too open to be useful for these species requiring forested habitats. Past timber management, human developments, roads, and the natural openness of certain habitats in the cumulative effects analysis area has partially reduced landscape-level connectivity in the cumulative effects analysis area.

Environmental Effects- Mature Forested Habitats and Landscape Connectivity:

No Action Alternative: Direct and Indirect Effects
No appreciable changes to existing stands would be anticipated. Stands providing forested cover that may be functioning as corridors, including riparian areas, saddles, and ridgelines, would not be altered. No changes in human developments, motorized access, or visual screening would occur. No changes in wildlife use would be expected. Thus, no direct or indirect effects to mature forested habitats and landscape connectivity would be expected since: 1) no changes to existing stands would occur; 2) no changes to human developments, motorized access, or visual screening would occur, and 3) no alterations to existing corridors would be anticipated.

No Action Alternative: Cumulative Effects
No appreciable changes to existing stands would be anticipated. Stands providing forested cover that may be functioning as corridors, including riparian areas, saddles, and ridgelines, would not be altered. Past harvesting has reduced the amount of mature, forested habitats in portions of the cumulative effects analysis area; however, continued successional advances are moving stands toward mature forests. This alternative would continue to contribute to the amount of mature forested stands in the cumulative-effects analysis area. No changes in human developments, motorized access, or visual screening would occur. No changes in wildlife use would be expected. Thus, no cumulative effects to mature forested habitats and landscape connectivity would be expected since: 1) no changes to existing stands would occur; 2) no changes to human developments, motorized access, or visual screening would occur; and 3) no alterations to existing corridors would be anticipated.

Action Alternative: Direct and Indirect Effects
Approximately 203 acres (32%) of mature Douglas-fir and ponderosa pine stands with a closed canopy would be harvested. These stands would receive a treatment that would reduce habitat for those species relying on mature, closed-canopied forested habitats. In general, habitats for those species adapted to more-open forest conditions would increase in the project area, meanwhile habitats for wildlife species that prefer dense, mature forest conditions would be reduced in the project area. Although these treatments would create more open stands that would not likely be used by wildlife species that use mature stands to move through the landscape, functional corridors, particularly along ridges, draws, and other topographic features, would be retained. Additionally, the only permanent human development constructed would be roughly 4.0 miles of new restricted road, but this would not be expected to concentrate human activity beyond the proposed activities. No changes in motorized public access would occur in the project area. Furthermore contract stipulations would minimize the presence of human-related attractants during the duration of the proposed activities. Some changes in visual screening would occur within individual units, but the combination of irregular-shaped units, topography, and un-harvested patches throughout the project area would minimize the effects of the reductions in visual screening. Thus, a minor risk of adverse direct and indirect effects to mature forested habitats and landscape connectivity would be expected since: 1) proposed activities could reduce forested cover in a portion of the project area, but functional corridors would be retained; 2) minor changes in human developments would occur, but no changes in human developments concentrating human activity or human-related attractants would occur; 3) no changes to motorized public access would occur; and 4) visual screening in portions of the project area would be reduced, but considerable visual screening would be retained across the project area.

Action Alternative: Cumulative Effects
Modifications to mature, forested habitats associated with this alternative would be additive to losses associated with past harvesting activities. Across the cumulative effects analysis area a variety of stands are providing for wildlife movements. No appreciable changes in the presence of human developments would occur, particularly no changes in the presence of human-related attractants or concentrations of human activities beyond the short duration of proposed activities. No changes to motorized public access to the cumulative effects analysis area would occur. Negligible reductions in visual screening in a small portion of the cumulative effects analysis area would be anticipated. Thus, a minor risk of adverse cumulative effects to mature forested habitats and landscape connectivity would be expected since: 1) proposed activities could reduce forested cover in a small portion of the cumulative effects analysis area, but functional corridors would exist; 2) negligible changes in human developments would occur, but no changes in human developments concentrating human activity or human-related attractants would occur; 3) no changes to motorized public access would occur; and 4) visual screening in a small portion of the

cumulative effects analysis area would be reduced, but considerable visual screening would persist across the cumulative effects analysis area.

Fine Filter Wildlife Analysis:

In the fine-filter analysis, individual species of concern are evaluated. These species include those listed as threatened or endangered under the Endangered Species Act of 1973, species listed as sensitive by DNRC, and animals managed as big game by Montana DFWP. Table WI-2 – Fine Filter provides an analysis of the anticipated effects for each species.

Table WI-2 –Anticipated Effects of the Heyer's Gulch Project on wildlife species

Species/Habitat	Potential for Impacts and Rationale [Y/N] Potential Impacts and Mitigation Measures N = Not Present or No Impact is Likely to Occur Y = Impacts May Occur (Explain Below) L = Low Potential for Effects
Threatened and Endangered Species	
Grizzly bear *(Ursus arctos)* Habitat: Recovery areas, security from human activity	[Y] Detailed analysis provided below.
Canada lynx (*Felix lynx)* Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zone	[Y] Detailed analysis provided below.
Sensitive Species	
Bald eagle *(Haliaeetus leucocephalus)* Habitat: Late-successional forest less than 1 mile from open water	[N] The proposed project area is outside of any home range associated with bald eagle territories in the vicinity. Thus, no direct, indirect, or cumulative effects to bald eagles would be anticipated.
Black-backed woodpecker *(Picoides arcticus)* Habitat: Mature to old burned or beetle-infested forest	[N] No preferred, recently (less than 5 years) burned areas are in the project area. Thus, no direct, indirect, or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative.
Coeur d'Alene salamander *(Plethodon idahoensis)* Habitat: Waterfall spray zones, talus near cascading streams	[N] No moist talus or streamside talus habitat occurs in the project area. Thus, no direct, indirect, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.
Columbian sharp-tailed grouse *(Tympanuchus Phasianellus columbianus)* Habitat: Grassland, shrubland, riparian, agriculture	[N] No suitable grassland communities occur in the project area. Thus, no direct, indirect, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
Common loon *(Gavia immer)* Habitat: Cold mountain lakes, nest in emergent vegetation	[N] No suitable lakes occur in the project area. Thus no direct, indirect, or cumulative effects to common loons would be expected under either alternative.
Fisher *(Pekania pennanti)* Habitat: Dense mature to old forest less than 6,000 feet in elevation and riparian	[Y] Detailed analysis provided below.
Flammulated owl *(Otus flammeolus)* Habitat: Late-successional	[Y] Detailed analysis provided below.

ponderosa pine and Douglas-fir forest	
Gray Wolf *(Canis lupus)* Habitat: Ample big game populations, security from human activities	[N] The project area is over 10 miles from the suspected Belmont wolf pack. No den or rendezvous sites are known to occur in the vicinity. Wolves may occasionally use the project area. Should wolves or an active wolf den site be detected in the immediate area, operations would cease, and a DNRC biologist would be consulted. Appropriate mitigations would be developed and applied prior to resuming activities. Thus, minimal direct, indirect or cumulative effects to wolves would be anticipated
Harlequin duck *(Histrionicus histrionicus)* Habitat: White-water streams, boulder and cobble substrates	[N] No suitable high-gradient stream or river habitats occur in the project area. No direct, indirect or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
Mountain plover (*Charadrius montanus*) Habitat: short-grass prairie, alkaline flats, prairie dog towns	[N] No prairie dog colonies or other shortgrass prairie habitats occur in the project area. Thus, no direct, indirect, or cumulative effects to mountain plovers would be anticipated to occur as a result of either alternative.
Northern bog lemming *(Synaptomys borealis)* Habitat: Sphagnum meadows, bogs, fens with thick moss mats	[N] No suitable sphagnum bogs or fens occur in the project area. Thus, no direct, indirect, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
Peregrine falcon *(Falco peregrinus)* Habitat: Cliff features near open foraging areas and/or wetlands	[N] No preferred cliffs or suitable rock outcrops suitable for use by peregrine falcons occur on, or within 1 mile of the proposed project area. Thus, no direct, indirect, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative.
Pileated woodpecker *(Dryocopus pileatus)* Habitat: Late-successional ponderosa pine and larch-fir forest	[Y] Detailed analysis provided below.
Townsend's big-eared bat *(Plecotus townsendii)* Habitat: Caves, caverns, old mines	[N] No suitable caves or mine tunnels are known to occur in the project area or vicinity. Thus, no direct, indirect or cumulative effects to Townsend's big-eared bats would be anticipated as a result of either alternative.
Wolverine *(Gulo gulo)* Habitat: Alpine tundra and high-elevation boreal and coniferous forests that maintain deep persistent snow into late spring	[N] Generally wolverines are found in sparsely inhabited remote areas near treeline characterized by cool to cold temperatures year round and rather deep and persistent snow well into the spring (Copeland et al. 2010). The availability and distribution of food is likely the primary factor in the large home range sizes of wolverines (Banci 1994). The project area is generally below the elevations where wolverines tend to be located. No areas of deep persistent spring snow occur in the project area. Individual animals could occasionally use lands in the project area while dispersing or possibly foraging, and they could be displaced by project-related disturbance if they are in the area during proposed activities. However, given their large home range sizes (~150 sq. mi. -- Hornocker and Hash 1981), and manner in which they use a broad range of forested and non-forested habitats, the proposed activities and alterations of forest vegetation on the project area would have negligible influence on wolverines. Thus, minimal direct, indirect or cumulative effects to wolverines would be anticipated.
Big Game Species	
Elk	[Y] No big game winter range exists in the project area. Potential

Moose	big game security habitat exists in the project area - Detailed analysis provided below.
Mule Deer	
White-tailed Deer	

Threatened and Endangered Species:
GRIZZLY BEAR

Issue
There is concern that the proposed activities could alter cover, reduce secure areas, and increase access, which could affect grizzly bears by displacing them from important habitats and/or increasing risk to bears of human-caused mortality.

Introduction
Grizzly bears are native generalist omnivores that use a diversity of habitats found in western Montana. Preferred grizzly bear habitats are meadows, riparian zones, avalanche chutes, subalpine forests, and big game winter ranges, all of which provide seasonal food sources. The search for food drives grizzly bear movements, with bears moving from low elevations in spring to higher elevations through the summer and early fall, as fruits ripen throughout the year. Primary habitat components in the project area include meadows, riparian areas, and big game winter ranges. Primary threats to grizzly bears are related to human-bear conflicts, habituation to unnatural foods near high-risk areas, and long-term habitat loss associated with human development (Mace and Waller 1997). Forest-management activities may affect grizzly bears by altering cover and/or by increasing human access into secure areas by creating roads (Mace et al. 1997). These actions could lead to the displacement of grizzly bears from preferred areas and/or result in an increased risk of human-caused mortality by bringing humans and bears closer together and/or making bears more detectable, which can increase the risk of bears being illegally shot. Displacing bears from preferred areas may increase their energetic costs, which may, in turn, lower their ability to survive and/or reproduce successfully.

Analysis Area
Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on a 44,442-acre area described above in the Analysis Areas portion of this analysis. This area approximates the home range size of a female grizzly bear.

Existing Environment
The project area is approximately 7 miles south of the Northern Continental Divide Ecosystem grizzly bear recovery area, and approximately 11 miles southwest of `occupied' grizzly bear habitat (Wittinger et al. 2002). However, grizzly bears are increasingly being documented south of the recovery zone (J. Jonkel, MT FWP, personal communication, 2011) and recently grizzly bears have been documented roughly 13 miles of the project area in the Cramer Creek area (DNRC 2011). Although grizzly bears have not been documented in the project area, use of the project area is possible. Grizzly bears generally use different habitats relative to season. The project area primarily provides mid- to high-elevation forested areas used during the summer along with some riparian habitats.

Managing human access is a major factor in management for grizzly bear habitat. There are no open roads in the project area. Open road densities are fairly high in the cumulative effects analysis area (1.3 mi. /sq. mi., simple linear calculation); and numerous open roads exist on the cumulative effects analysis area boundary, which would effectively increase the potential for disturbance to grizzly bears in the cumulative effects analysis area. Hiding cover exists on roughly 376 acres (59%) in the project area. On DNRC-managed lands in the cumulative effects analysis area, hiding cover exists on 9,697 acres (55% of DNRC-managed lands); grizzly bear hiding cover is likely present on most of the 5,664 acres (21% of non-DNRC lands) of forested stands with ≥40% canopy closure across the cumulative effects analysis area. Within the cumulative effects analysis area, hiding cover is largely absent from the 9,904 acres (37% of non-DNRC lands) of shrubs, herbaceous, and non-forested habitats and is likely somewhat limited on the other 10,953 acres (41% of non-DNRC lands) of sparsely stocked and young forest habitats in the cumulative effects analysis area. The habitats in the project area contribute to grizzly bear security habitat (blocks ≥ 0.3 miles from roads receiving motorized use and ≥2,500 acres in size); within the cumulative effects analysis area a 30,708-acre block (69% of the cumulative effects analysis area) of grizzly bear security habitat exists. Timber harvesting and human development that is occurring or has occurred in the cumulative effects analysis area likely altered grizzly bear habitats and/or human disturbance levels. Across the cumulative effects analysis area, the reductions in hiding cover, the elevated levels of human disturbance, and the mosaic of available habitats likely limits the overall usefulness of the cumulative effects analysis area for grizzly bears.

Environmental Effects- Grizzly Bears

No Action Alternative: Direct and Indirect Effects
No direct or indirect effects to grizzly bears would be anticipated since: 1) no disturbance or displacement would be expected, 2) no changes in hiding cover would occur, 3) security habitat would not be altered, 4) no changes in long-term open-road density would be anticipated, and 5) no changes in availability of unnatural bear foods or attractants would occur.

No Action Alternative: Cumulative Effects
No appreciable changes to existing habitats would be anticipated; advances in succession within those recently harvested stands could improve hiding cover and potentially foraging habitats for grizzly bears. Thus, no further adverse cumulative effects to grizzly bears would be anticipated since: 1) no changes in human disturbance levels would be expected; 2) no changes to open road density would occur; 3) no further modifications to hiding cover would occur; 4) no changes to security habitat would be expected; and 5) no changes in availability of unnatural bear foods or attractants would occur.

Action Alternative: Direct and Indirect Effects
This alternative might affect grizzly bears directly through increased road traffic, noise, and human activity, and indirectly by altering the amount of hiding cover and forage resources. Activities in grizzly bear habitats reduce grizzly bear security, possibly resulting in increased stress and/or energy expenditure to endure the disturbance or to move from the area. These disturbances would only be present during harvesting operations; therefore, the season of disturbance is important in addressing effects to grizzly bears. Proposed harvesting would likely occur during the non-denning period; some disturbance of grizzly bears would be possible with activities that may occur during the non-denning period. Overall, the proposed activities would occur in areas where low levels of grizzly bear use would be anticipated, leading to minor potential for disturbance and displacement of grizzly bears.
Hiding cover, defined as vegetation that will hide 90 percent of a grizzly bear at a distance of 200 feet, would be reduced on most of the 134 acres (36%) of hiding cover proposed to receive treatments. Some hiding cover in the form of brush, shrubs, and sub-merchantable trees would persist in several of the units, albeit at a reduced level from the existing condition; hiding cover would increase through time as young trees and shrub regeneration proceeds over the next 5 to 10 years.

Roughly 4.0 miles of new, restricted roads would be constructed with the proposed activities. No changes in open road density or motorized public access would be anticipated. Some increases in non-motorized public access could occur on the newly constructed roads. Although hiding cover would be reduced, no appreciable changes to security habitat would occur given no open roads would exist in the project area. If contractors request to camp on or near the project area, they would be required by the operating contract to store any unnatural bear foods and attractants in a bear resistant manner; any unnatural bear foods or attractants (such as garbage) would be kept in a bear resistant manner. Compliance with contract terms would frequently be evaluated and would be enforced by a DNRC contract administrator. Any added risk to grizzly bears associated with unnatural bear foods or attractants would be minimal. Thus, a minor risk of adverse direct or indirect effects to grizzly bears would be anticipated since: 1) minor disturbance and displacement would be possible; 2) hiding cover would be reduced in a portion of the project area, but would remain in portions of the project area, and would be expected to recover in the short-term; 3) no changes to security habitat would be expected; 4) no changes to long-term open road density would be anticipated; and 5) negligible increases in the availability of unnatural bear foods or attractants would be anticipated.

Action Alternative: Cumulative Effects
The increased use of road systems during the proposed project could temporarily increase human disturbance to grizzly bears within a portion of the cumulative effects analysis area. Collectively, short-term (2-4 years) increases in human disturbance would be anticipated in the cumulative effects analysis area. Continued use of the cumulative effects analysis area by grizzly bears would be anticipated at levels similar to present. On DNRC-managed lands in the cumulative effects analysis area, hiding cover would continue to be present on 9,563 acres (54% of non-DNRC managed lands) and no changes to the hiding cover on other ownerships would be anticipated. Reductions in hiding cover would be additive to the reductions from past timber harvesting, ongoing harvesting, as well as more permanent land-cover changes in the cumulative effects analysis area. Early successional stages of vegetation occurring in

harvest units could provide additional foraging opportunities. Quality of grizzly bear security habitat would be reduced in short-term, but would persist through time. No changes in long-term open-road density would be anticipated; an increase in non-motorized access to a small portion of the cumulative effects analysis area could occur. Thus, a minor risk of adverse cumulative effects to grizzly bears would be anticipated since: 1) increases in human disturbance levels in the short-term could occur in a small portion of the cumulative effects analysis area; 2) hiding cover would be removed in the short-term on 134 acres in the cumulative effects analysis area; 3) no changes in long-term open road density would occur, 4) no changes to security habitat would be expected; and 5) negligible increases in the availability of unnatural bear foods or attractants would be anticipated.

CANADA LYNX:

Issue
There is concern that the proposed activities could negatively affect Canada lynx by altering lynx summer foraging habitat, winter foraging habitat, and other suitable habitat, rendering these habitats unsuitable for supporting lynx.

Introduction
Canada lynx are associated with subalpine fir forests, generally between 4,000 to 7,000 feet in elevation in western Montana (Ruediger et al. 2000). The proposed project area ranges from approximately 3,760 to 5,560 feet in elevation and is dominated by Douglas-fir. Lynx in western Montana preferred mature, multi-storied stands with dense horizontal cover year-round; during the summer lynx also selected earlier successional stands with a high horizontal cover (Squires et al. 2010). For denning sites, the primary component appears to be abundant large woody debris, particularly in the form of downed logs, root wads, slash piles, and live trees (Squires et al. 2008). These conditions are found in a variety of climax vegetation habitat types, particularly within the subalpine fir series (Pfister et al. 1977). Historically, high intensity, stand-replacing fires of long fire intervals (150 to 300 years) occurred in continuous dense forests of lodgepole pine, subalpine fir, and Engelmann spruce. These fires created extensive even-aged patches of regenerating forest intermixed with old stands that maintained a mosaic of snowshoe hare and lynx habitat.

Analysis Area
Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on a 44,442-acre area described above in the Analysis Areas portion of this analysis. The scale of this analysis area approximates the home range size of an individual lynx (Ruediger et al. 2000).

Existing Environment
Approximately 252 acres (39% of the project area) of lynx habitat occur in the project area. Much of this habitat was identified other suitable habitats (largely forested lands that provide cover to facilitate movement; 163 acres; 25% of project area), with lesser amounts of winter foraging (90 acres; 14% of project area). Connectivity of forested habitats in the project area is relatively intact.
Potential lynx habitats exist on roughly 4,397 acres of DNRC-managed lands (25%) in the cumulative effects analysis area, including 1,417 acres (8% of DNRC-managed lands) of foraging habitats, 2,557 acres (14% of DNRC-managed lands) of other suitable habitats, and 423 acres (2% of DNRC-managed lands) of temporary non-suitable habitats. On other ownerships, there are roughly 5,664 acres (21% of non-DNRC lands) of forested stands with ≥40% canopy closure across the cumulative effects analysis area; a portion of those stands would likely be suitable lynx habitats and probably include some winter foraging habitats. Additionally younger summer foraging habitats likely exists on a portion of the 10,953 acres (41% of non-DNRC lands) of sparsely stocked and young forest on other ownerships; no lynx habitats likely exist on the 9,904 acres (37% of non-DNRC lands) of shrubs, herbaceous, and non-forested types on other ownerships in the cumulative effects analysis area. Roughly 74.7% of habitats on DNRC-managed lands administered by the Southwestern Land Office under the HCP and outside of the Lynx Management Areas are in suitable lynx habitat categories.

Environmental Effects- Canada Lynx

No Action Alternative: Direct and Indirect Effects
In the short-term, no changes in lynx habitat elements would be expected in the project area. Landscape connectivity would not be altered. Thus, a negligible risk of adverse direct and indirect effects to Canada

lynx would be expected since: 1) existing winter foraging habitats would persist; 2) summer foraging habitats would continue to be absent from the project area; 3) the amount of temporary non-suitable habitats would not increase; and 4) landscape connectivity would not be altered.

No Action Alternative: Cumulative Effects
No appreciable change in lynx habitats in the cumulative effects analysis area would occur. No appreciable changes to landscape connectivity would be anticipated. Roughly 74.7% of habitats on DNRC-managed lands administered by the Southwestern Land Office under the HCP and outside of the Lynx Management Areas would be in suitable lynx habitat categories following this alternative. Thus, a negligible risk of adverse cumulative effects to lynx would be expected since: 1) winter foraging habitats would persist in the cumulative effects analysis area; 2) summer foraging habitats would continue developing in the near-term across the cumulative-effects analysis area, but longer-term availability of summer foraging habitats would likely decline without disturbance; 3) no changes in the amount of the cumulative-effects analysis area that is in the temporary non-suitable habitat class would occur; and 4) landscape connectivity would not be altered.

Action Alternative: Direct and Indirect Effects
Approximately 44 acres of lynx habitats (17% of lynx habitats in the project area) would be harvested with this alternative, including 29 acres winter foraging habitats (12% of lynx habitats) and 15 acres (6% of lynx habitats) of other suitable habitats. These areas would receive a treatment that would reduce canopy cover and horizontal cover while preparing for regenerating trees, which would reduce the habitat quality for lynx in the short-term. While some of these habitats could maintain sufficient cover to continue functioning as `other' lynx habitats, the majority would likely drop below the 40% canopy closure threshold that differentiates between suitable and temporary non-suitable habitats due to harvesting corridors, skid trails, damage to sub-merchantable trees, landings, and low original stand density. Thus, up to 17% of the lynx habitats in the project area would be converted to temporary non-suitable habitats, and 83% would not be altered with the proposed activities. In the future as tree seedlings and shrubs recover in these stands, they would begin providing additional habitats for snowshoe hares. The retention of patches of advanced regeneration of shade-tolerant trees, such as sub-alpine fir, would break-up sight distances, provide horizontal cover, and provide forest structural attributes preferred by snowshoe hares and lynx. In all proposed units, coarse woody debris would be retained (emphasizing retention of some logs 15 inches dbh and larger) to provide some horizontal cover and security structure for lynx. In the short-term, lynx use of the project area could decline due to the resulting openness on a portion of the project area. Forested connectivity would be altered with the proposed activities, but overall connectivity would be retained. Collectively, a minor risk of adverse direct and indirect effects to Canada lynx would be expected since: 1) some winter foraging habitats could be reduced, but the majority of the winter foraging habitats would not be altered; 2) no changes to summer foraging habitats would occur, and some future summer foraging habitats could be created; 3) the amount of the project area in the temporary non-suitable lynx habitat category would increase up to 17%, depending on density of trees retained in the units in lynx habitats; and 4) connectivity could be altered, but corridors would be maintained.

Action Alternative: Cumulative Effects
Within the cumulative-effects analysis area, limited changes to existing lynx habitats would occur and at least 3,930 acres (89% of all potential lynx habitats) of DNRC-managed lands would continue to support suitable lynx habitats and up to 467 acres (11%) would be in the temporary non-suitable habitat category. The minor reductions in winter foraging (29 acres) and other suitable habitats (15 acres) coupled with an increase in temporary non-suitable habitats (44 acres) on a small portion of the cumulative effects analysis area could slightly decrease the quality of the lynx habitats in the larger cumulative effects analysis area. Near-term increases in summer foraging habitats could occur with the proposed harvesting within a portion of the cumulative effects analysis area, however, the majority of the proposed harvesting would not occur in potential lynx habitats and summer foraging habitats are fairly common in the cumulative effects analysis area. Anticipated reductions in lynx habitats would be additive to past losses from timber harvesting and any ongoing modifications in the cumulative-effects analysis area; likewise, increases in temporary non-suitable lynx habitats would be additive to habitats that have been recently converted due to timber harvesting. A fairly minor amount (11%) of the DNRC-managed lands in the cumulative effects analysis area would be in the temporary non-suitable lynx habitats, meaning most of the lynx habitats would be in a usable state for lynx. No changes to the other suitable lynx habitats on

other ownerships would be anticipated. Forest connectivity would be modified in the project area, but negligible changes to connectivity across the cumulative effects analysis area would be anticipated. Roughly 74.5% of habitats on DNRC-managed lands administered by the Southwestern Land Office under the HCP and outside of the Lynx Management Areas would be in suitable lynx habitat categories following proposed treatments. Thus, a minor risk of adverse cumulative effects to Canada lynx would be expected since: 1) winter foraging habitats would persist; 2) summer foraging habitats would continue developing for the next 10 to 30 years; 3) minor amounts of lynx habitats would be in the temporary non-suitable habitat category, meaning most of the lynx habitats would be in a usable state for lynx; and 4) negligible alterations in landscape connectivity would not prevent lynx movements.

Sensitive Species:

FISHER

Issue
There is concern that the proposed activities could reduce the amount and/or quality of fisher habitats, which could alter fisher use of the area.

Introduction
Fishers are a mid-sized forest carnivore whose prey includes small mammals such as voles, squirrels, snowshoe hares, and porcupines, as well as birds (Powell and Zielinski 1994). They also take advantage of carrion and seasonally available fruits and berries (Foresman 2012). Fishers use a variety of successional stages, but are disproportionately found in stands with dense canopies (Powell 1982, Johnson 1984, Jones 1991, Heinemeyer and Jones 1994) and avoid openings or young forested stands (Buskirk and Powell 1994). However, some use of openings may occur for short hunting forays or if sufficient overhead cover (shrubs or saplings) is present. Fishers appear to be highly selective of stands that contain resting and denning sites and tend to use areas within 150 feet of water (Jones 1991). Resting and denning sites are found in cavities of live trees and snags, downed logs, brush piles, mistletoe brooms, squirrel and raptor nests, and holes in the ground. Forest-management considerations for fisher involve providing for resting and denning habitats near riparian areas while maintaining travel corridors.

Analysis Area
Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on the 44,442-acre cumulative effects analysis area described above in the Analysis Areas portion of this analysis. This scale includes enough area to approximate overlapping home ranges of male and female fishers (Heinemeyer and Jones 1994).

Existing Environment
There are approximately 55 acres of potential upland fisher habitats and 7 acres of potential riparian habitats in the project area. Within the cumulative effects analysis area, there are roughly 16,375 areas that would be classified as upland (more than 100 ft from Class 1 and more than 50 feet from Class 2 streams) and 889 acres that would be classified as riparian that are associated with the 162 miles of streams in the cumulative effects analysis area. On DNRC-managed lands in the cumulative effects analysis area, there are roughly 327 acres (1.9% of DNRC-lands) of potential riparian habitats and 4,202 acres (24% of DNRC lands) of potential upland habitats. Additionally, there are 120 acres (1% of DNRC lands) of riparian and 3,290 acres (19% of DNRC lands) of upland preferred covertypes that currently lack sufficient structure to meet habitat needs for fishers. The majority of the cumulative effects analysis area is not in preferred covertypes (54%). On DNRC-managed lands, roughly 73% of the potential riparian fisher habitats in the cumulative effects analysis area are providing structural habitat attributes that would facilitate use by fisher. In the future, potentially suitable fisher habitats could develop on a portion of the 3,410 acres of riparian and upland preferred covertypes on DNRC-managed lands that are currently lacking structural attributes to meet the needs of fishers. Potential fisher habitats likely exist on a portion of the 5,664 acres (21% of non-DNRC lands) of forested stands with ≥40% canopy closure across the cumulative effects analysis area. Within the cumulative effects analysis area, fisher habitats are largely absent from the 9,904 acres (37% of non-DNRC lands) of shrubs, herbaceous, and non-forested habitats and is likely fairly limited on the other 10,953 acres (41% of non-DNRC lands) of sparsely stocked and young forest habitats in the cumulative effects analysis area.

Environmental Effects-Fisher

No Action Alternative: Direct and Indirect Effects

No direct and indirect effects to fishers would be anticipated since: 1) no changes to existing habitats would be anticipated; 2) landscape connectivity would not be further altered; 3) no appreciable changes to snags, snag recruits, and coarse woody debris levels would be anticipated; and 4) no changes to public access or the potential for trapping mortality would be anticipated.

No Action Alternative: Cumulative Effects

No further cumulative effects to fishers would be anticipated since: 1) no changes to existing habitats on DNRC-managed lands would occur; 2) any landscape connectivity afforded by the stands on DNRC-managed lands would not change appreciably; 3) no changes to snags, snag recruits, or coarse woody debris levels would be expected; and 4) no changes to public access or the potential for trapping mortality would be anticipated.

Action Alternative: Direct and Indirect Effects

No riparian habitats would be altered with this alternative. Approximately 7 of the 55 acres (13%) of upland fisher habitats in the project area would receive treatments that leave stands that would likely be too open to be used by fisher. No changes in open roads would be anticipated, which would not likely alter trapping pressure and the potential for fisher mortality. Negligible reductions in landscape connectivity could occur with the proposed activities, but activities would avoid riparian areas commonly used by fisher. Thus, a minor risk of adverse direct and indirect effects to fisher would be anticipated since: 1) harvesting would avoid riparian areas, but would modify or remove fisher upland fisher habitats depending the density of trees retained within the proposed units; 2) negligible reductions in landscape connectivity would occur, but those areas associated with riparian areas would remain unaffected; 3) harvesting would reduce snags and snag-recruitment trees while increasing coarse woody debris levels; however, some of these resources would be retained; and 4) no appreciable changes in motorized human-access levels would be anticipated.

Action Alternative: Cumulative Effects

Since no riparian habitats would be modified, no changes in the amount of the preferred riparian fisher cover types meeting structural requirements for fishers at the cumulative-effects analysis area would occur. Negligible reductions in upland habitats on DNRC-managed lands (0.2%) would lead to negligible reductions in the amount of suitable upland fisher habitats in the cumulative effects analysis area. These reductions would be additive to the losses associated with past timber harvesting in the cumulative-effects analysis area as well as any ongoing harvesting. No appreciable changes to landscape connectivity would be anticipated, and activities would avoid riparian areas commonly used by fisher. No appreciable changes in human disturbance and potential trapping mortality would be anticipated. Thus, a minor risk of adverse cumulative effects to fisher would be anticipated since: 1) harvesting would modify a small amount of upland fisher habitats, but upland habitats would persist; 2) no appreciable changes in landscape connectivity would be anticipated and connectivity in riparian areas would not be altered; 3) harvesting in a relatively small portion of the cumulative-effects analysis area would partially reduce snags and snag recruits, while increasing the coarse woody debris levels, largely in the smaller-sized pieces; and 4) no appreciable changes to motorized public access would occur.

FLAMMULATED OWLS

Issue

There is concern that the proposed activities may alter flammulated owl habitat by reducing canopy closure and increasing tree spacing, and could remove snags needed by flammulated owls for nesting.

Introduction

Flammulated owls are tiny, migratory, insectivorous forest owls that inhabit old, open stands of warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States and are secondary cavity nesters. In general, preferred habitats have open to moderate canopy closure (30-50 percent) with at least 2 canopy layers, and are often near small clearings. They usually nest in cavities excavated by pileated woodpeckers or northern flickers in 12-25" dbh ponderosa pine, Douglas-fir, or aspen. Without disturbance, Douglas-fir encroach upon ponderosa pine stands resulting in increased stand density and decreased habitat quality for flammulated owls. Periodic, low-intensity underburns can increase habitat

suitability and sustainability by reducing the density of understory seedlings and saplings, stimulating shrub growth, and by protecting large dominant trees from ladder fuels and competition with other mature trees.

Analysis Area
Direct and indirect effects were analyzed on the project area (649 acres). Cumulative effects were analyzed on the 5,217-acre cumulative effects analysis area described above in the Analysis Areas portion. This area includes enough area to support several pairs of flammulated owls (McCallum 1994).

Existing Environment
There are approximately 397 acres (61%) of potential flammulated owl habitats in the dry Douglas-fir stands across the southern portion of the project area. Within the cumulative effects analysis area, there are approximately 2,199 acres (68% of DNRC-managed lands) of potential flammulated owl habitats on DNRC-managed lands (including those in the project area). Additionally, some suitable habitats likely exist on a portion of the 1,321 acres of open and closed forested habitats on other ownerships in the cumulative effects analysis area (56% of non-DNRC lands). A portion of those habitats in the cumulative effects analysis area have been harvested in the recent past, potentially improving flammulated owl habitat by creating foraging areas and reversing a portion of the Douglas-fir and ponderosa pine encroachment; however retention of large ponderosa pine and/or Douglas-fir was not necessarily a consideration in some of these harvest units, thereby minimizing the benefits to flammulated owls. Modern fire suppression has allowed Douglas-fir in-growth to create denser stands of ponderosa pine and Douglas-fir in portions of the cumulative effects analysis area, which has reduced habitat quality for flammulated owls.

Environmental Effects-Flammulated Owl

No Action Alternative: Direct and Indirect Effects
Existing flammulated owl habitats in the project area would persist. Thus, a negligible risk of adverse direct and indirect effects to flammulated owls would be anticipated since: 1) no disturbance to flammulated owls would be anticipated; and 2) no changes to potential nesting habitats would be anticipated.

No Action Alternative: Cumulative Effects
Existing flammulated owl habitats would persist. Thus, a negligible risk of adverse cumulative effects to flammulated owls would be anticipated since: 1) no disturbance to flammulated owls would be anticipated; and 2) no changes to potential nesting habitats would be anticipated.

Action Alternative: Direct and Indirect Effects
Flammulated owls are tolerant of human disturbance (McCallum 1994), however the elevated disturbance levels associated with harvesting could negatively affect flammulated owls should activities occur when flammulated owls are present. Proposed timber harvest on 158 acres of flammulated owl habitats (40% of the habitats in the project area) would open the canopy while favoring western larch, ponderosa pine, and Douglas-fir. Elements of the forest structure important for nesting flammulated owls, including snags, coarse woody debris, numerous leave trees, and snag recruits would be retained in the proposed units. The subsequent regeneration in the existing habitats would likely be beneficial for flammulated owls as potential foraging habitats. The more open stand conditions, the retention of fire adapted tree species, and the maintenance of snags would move the project area toward historical conditions, which is preferred flammulated owl habitat. Thus, a minor risk of adverse direct and indirect effects would be expected to flammulated owls since: 1) the potential exists to disturb flammulated owls; and 2) harvesting would open denser stands up while retaining elements of forest structure used for foraging and nesting by flammulated owl, improving flammulated owl habitat conditions.

Action Alternative: Cumulative Effects
Disturbance to flammulated owls would be possible on a small portion of the cumulative effects analysis area (3%). Proposed harvesting would increase the amount of the cumulative effects analysis area that has been recently harvested, which would add to the amount of foraging habitats available, but possibly at the expense of losing snags and large trees important for nesting. Overall no change in the amount of potential flammulated owl habitats would exist on DNRC-managed lands or any other ownerships; a slight improvement in habitat quality at the cumulative-effects analysis level could be realized with this

alternative and the more historic conditions likely after proposed activities. Thus, a negligible risk of adverse cumulative effects to flammulated owls would be expected since: 1) harvesting could disturb flammulated owls in a small portion of the cumulative effects analysis area should activities occur during the period when flammulated owls are in the vicinity; and 2) harvesting would improve the quality and sustainability of flammulated owl habitat on a portion of the cumulative effects analysis area by making this area more representative of historic conditions.

PILEATED WOODPECKERS

Issue
There is concern that the proposed activities could reduce suitable nesting and foraging habitat for pileated woodpeckers, which could alter pileated woodpecker use of the area.

Introduction
The pileated woodpecker is one of the largest woodpeckers in North America and excavates the largest cavities of any woodpecker. Preferred nest trees are large diameter western larch, ponderosa pine, cottonwood, and quaking aspen trees and snags, usually 20 inches dbh and larger. Pileated woodpeckers primarily eat carpenter ants, which inhabit large downed logs, stumps, and snags. Aney and McClelland (1985) described pileated nesting habitat as "...stands of 50 to 100 contiguous acres, generally below 5,000 feet in elevation with basal areas of 100 to 125 square feet per acre and a relatively closed canopy." The feeding and nesting habitat requirements, including large snags or decayed trees for nesting and downed wood for feeding, closely tie these woodpeckers to mature forests with late-successional characteristics. The density of pileated woodpeckers is positively correlated with the amount of dead and/or dying wood in stands (McClelland 1979).

Analysis Area
Direct and indirect effects were analyzed for activities conducted in the project area (649 acres). Cumulative effects were analyzed on the 5,217-acre cumulative effects analysis area described above in the Analysis Areas portion of this analysis. This scale includes enough area to support a couple of pairs of pileated woodpeckers (Bull and Jackson 1995).

Existing Environment
In the project area, potential pileated woodpecker nesting habitat exists on approximately 598 acres (92% of the project area). These habitats are dominated by Douglas-fir. Additionally, 51 acres (8% of the project area) of sawtimber stands, dominated by Douglas-fir, exist in the project area, which are potential foraging habitats. Within the cumulative-effects analysis area, roughly 1,386 acres of potential pileated woodpecker habitats exist on DNRC-managed lands (43% of DNRC-managed lands in the cumulative effects analysis area) and an additional 737 acres of sawtimber stands exist on DNRC-managed lands in the cumulative effects analysis area that may be suitable foraging habitats (23% of DNRC- managed lands in the cumulative effects analysis area). Additionally, some suitable habitats likely exist on a portion of the 479 acres of reasonably closed forested habitats on other ownerships in the cumulative effects analysis area (24% of non-DNRC lands), and some of the 488 acres of moderately stocked forested stands on those other ownerships could also be suitable foraging habitats (25% of non-DNRC lands). Much of the 1,002 acres (51%) of shrubs, herbaceous areas, poorly stocked forested stands, and recently harvested stands on other ownerships in the cumulative effects analysis area is likely too open to be useful to pileated woodpeckers.

Environmental Effects-Pileated Woodpecker

No Action Alternative: Direct and Indirect Effects
A negligible risk of adverse direct and indirect effects to pileated woodpeckers would be expected since: 1) no harvesting would occur; 2) no changes in the amount of continuously forested habitats would be anticipated; 3) no appreciable changes to existing pileated woodpecker habitats would be anticipated; and 4) long-term, succession-related declines in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would be anticipated.

No Action Alternative: Cumulative Effects
No disturbance of pileated woodpeckers would occur. Continued use of the cumulative-effects analysis area by pileated woodpeckers would be expected at similar levels as presently occurring. Thus, a negligible risk of adverse cumulative effects to pileated woodpeckers would be expected since: 1) no

further changes to existing habitats would occur; 2) no further changes to the amount of continuously forested habitats available for pileated woodpeckers would be anticipated; and 3) long-term, succession-related changes in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would occur.

Action Alternative: Direct and Indirect Effects
Pileated woodpeckers tend to be tolerant of human activities (Bull and Jackson 1995), but might be temporarily displaced by any proposed activities that may occur during the nesting period. Harvesting would reduce forested habitats for pileated woodpeckers. Roughly 189 acres (32.0%) of the potential nesting habitat would be modified as well as 13 acres (25.5%) of potential foraging habitats. A portion of those habitats would receive treatments that reduce habitat quality for pileated woodpeckers, but the majority of the habitats would be temporarily unsuitable for pileated woodpeckers due to the openness of the stands following proposed treatments. Potential pileated woodpecker habitats would be reduced for 30-100 years, depending on the density of trees retained. Elements of the forest structure important for nesting pileated woodpeckers, including snags, coarse woody debris, numerous leave trees, and snag recruits would be retained in the proposed harvest areas. Since pileated woodpecker density is positively correlated with the amount of dead and/or dying wood in a stand (McClelland 1979), pileated woodpecker densities in the project area would be expected to be reduced on 202 acres. The silvicultural prescriptions would retain healthy western larch, ponderosa pine, and Douglas-fir while promoting the growth and/or regeneration of many of these same species, which would benefit pileated woodpeckers in the future by providing nesting, roosting, and foraging habitats. Thus, a minor risk of adverse direct and indirect effects to pileated woodpeckers would be anticipated since: 1) harvesting would reduce the amount of continuous-forested habitats available; 2) potential nesting habitats and foraging habitats would be removed, but the majority (68% of existing habitats) would be retained; 3) snags and snag recruits would be removed; however, mitigation measures to retain some snags and snag recruits would be included, and 4) proposed treatments would promote seral species in the project area.

Action Alternative: Cumulative Effects
Reductions in pileated woodpecker habitats and the amount of continuously forested habitats available for pileated woodpeckers would occur. On DNRC-managed lands, roughly 1,197 acres (37%) of nesting and 38 acres (1%) of foraging habitats would persist; no changes to the existing habitats on other ownerships would be anticipated. Snags, coarse woody debris, and potential nesting trees would be retained in the project area; however, future recruitment of these attributes may be reduced in a portion of the area by the proposed activities. Any modifications to pileated woodpecker habitats under this alternative would be additive to habitat losses associated with past harvesting; continued use of the cumulative effects analysis area would be anticipated. Continued maturation of stands across the cumulative-effects analysis area would provide future pileated woodpecker habitats. Thus, a minor risk of adverse cumulative effects to pileated woodpeckers would be anticipated since: 1) harvesting would further reduce the amount of continuous forested habitats available in the cumulative-effects analysis area; 2) potential nesting and foraging habitats would be reduced, but habitats would persist in the cumulative-effects analysis area; 3) snags and snag recruits would be removed; however, mitigation measures would retain some of these attributes; and 4) proposed treatments would promote seral species in the project area.

BIG GAME:

BIG GAME SECURITY HABITAT

Issue
There is concern that the proposed activities could reduce security habitat and seasonal cover for moose, elk, white-tailed deer, and mule deer, resulting in reduced numbers and/or their displacement from the area.

Introduction
Timber harvesting can increase vulnerability of big game animals by changing the size, structure, juxtaposition, and accessibility of areas that provide security during hunting season (Hillis et al. 1991). As visibility and accessibility increase within forested landscapes, moose, elk and deer have a greater probability of being observed and, subsequently, harvested by hunters, or they may become displaced or reduced in numbers due to lowered effective carrying capacity of the local habitat. Reduced cover

attributable to logging and roads can also influence the effective use of habitat for big game species. For the purpose of this analysis, cover was considered generically as big game cover for the four species of concern. Because elk are highly social, wide-ranging species, providing for their cover needs helps ensure that habitat needs for other ungulates, such as deer and moose are met as well. Because of their smaller size and behavioral differences, mule deer and white-tailed deer are able to use smaller cover patches more effectively for escape and security. Moose are a solitary, wide-ranging species capable of effectively using relatively small cover patches, and the hunting season for moose is heavily regulated, greatly reducing risk of overharvest by humans. Therefore, for this analysis it is assumed that if available security cover would provide for the needs of elk, it would also generally be adequate to meet the needs of moose, mule deer, and white-tailed deer.

Analysis Area
Direct and indirect effects were considered at the scale of the project area (647 acres). Cumulative effects were analyzed on the 44,442-acre area described above in the Analysis Areas portion of this analysis. This scale includes enough area to support hundreds of elk.

Existing Environment
Big game security habitat are nonlinear blocks of hiding cover that are more than 0.5 mile from open roads and are a minimum of 250 acres in size. Hiding cover is abundant in the project area. No motorized access to the project area exists; very few restricted roads exist that could facilitate limited non-motorized access. Thus the entire 647 acre-project area contains sufficient hiding cover, is distant enough from open roads, and is large enough to be considered big game security habitat.
Hiding cover varies within the cumulative effects analysis area with the recent modifications from timber management, but the combination of topography, distance from open roads, and the presence of regenerating vegetation likely provides adequate cover for elk during the hunting season. In the cumulative effects analysis area, access for recreational hunting is relatively restricted, with several open roads near the perimeter (at least 89 miles, 1.3 miles/sq. mile) that facilitate access and numerous restricted roads (at least 268 miles; 5.2 miles/sq. mile) that could be used for non-motorized use. Within the cumulative effects analysis area a 26,419-acre patch (roughly 59% of the cumulative effects analysis area) of security habitat exists.

Environmental Effects-Big Game Security Habitat

No Action Alternative: Direct and Indirect Effects
None of the proposed forest management activities would occur in the project area. No risk of adverse direct and indirect effects to security habitat for moose, elk, mule deer, and white-tailed deer would be expected since: 1) no changes in existing security habitat would be anticipated and continued maturation of forest cover would improve big game security habitat; 2) the level of public access to the project area would not change; and 3) no appreciable changes to big game survival would be anticipated.

No Action Alternative: Cumulative Effects
No changes in big game security habitat would be anticipated. Past harvesting has reduced big game security habitat and allowed increased human access; continued maturation in previously harvested stands in the cumulative-effects analysis area would improve hiding cover in those areas. No other changes in disturbance and potential mortality due to hunting would be anticipated. Thus, no adverse cumulative effects to big game security habitat would be anticipated since: 1) no reductions in big game security habitat would occur and modest levels of security habitat and hiding cover would persist within the cumulative-effects analysis area; 2) no changes in open roads, motorized access, or public access would occur; and 3) no appreciable changes to big game survival would be anticipated.

Action Alternative: Direct and Indirect Effects
Tree density within proposed units would be reduced on 203 acres, leaving 443 acres (68%) of mature forests in the project area contributing to big game security habitat following proposed activities. Hiding cover would be reduced within the proposed units, but could improve as trees and shrubs become reestablished in the openings over the next 10-20 years. The retention of structure within proposed units and unharvested areas between the various units would reduce the potential effects of the hiding cover reductions. Slight increases in sight distance would be anticipated. Overall, changes to sight distance and hiding cover would negligibly affect big game vulnerability risk in the project area. No changes in open roads or motorized access for the general public would occur. During all phases of the project, any roads

opened with project activities would be restricted to the public and closed after the completion of project activities. Slight increases in non-motorized access would occur with the proposed construction of 4.0 miles of restricted roads. Numerous contract stipulations would minimize the effect on the existing big game security habitat by prohibiting contractors from carrying firearms while conducting contract operations and prohibiting contractors from accessing restricted areas for other purposes, such as hunting. Collectively, a negligible risk of adverse direct and indirect effects to big game security habitat would be anticipated since: 1) modifications to existing hiding cover would reduce the quality of the big game security habitat in the project area; 2) no changes in open roads or motorized access for the general public would be anticipated and negligible increases in non-motorized access would occur that would alter hunter access; and 3) negligible changes in big game survival would be anticipated.

Action Alternative: Cumulative Effects
Alterations of cover could reduce the quality of big game security habitat in a small portion of the cumulative effects analysis area. Continued maturation across the cumulative-effects analysis area would improve hiding cover and big game security habitat. No changes in public, motorized access and negligible increases in non-motorized access would be expected, which would not affect big game vulnerability in the cumulative effects analysis area. Negligible effects to big game survival would be anticipated. Thus, a minor risk of adverse cumulative effects to big game security habitat would be anticipated since: 1) quality of hiding cover in a small portion of the cumulative effects analysis area would be reduced, which would reduce the quality of the big game security habitat, but security habitat and hiding cover would persist in the cumulative-effects analysis area; 2) no changes in open roads or motorized access for the general public would be expected and only negligible increases in non-motorized access would occur that would alter hunter access; and 3) negligible changes in big game survival would be anticipated.

Wildlife Mitigations:

- A DNRC biologist will be consulted if a threatened or endangered species is encountered to determine if additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (ARM 36.11.428 through 36.11.435) are needed.
- Motorized public access will be restricted at all times on restricted roads that are opened for harvesting activities; signs will be used during active periods and a physical closure (gate, barriers, equipment, etc.) will be used during inactive periods (nights, weekends, etc.). These roads and skid trails would be reclosed to reduce the potential for unauthorized motor vehicle use.
- Snags, snag recruits, and coarse woody debris will be managed according to *ARM 36.11.411* through *36.11.414*, particularly favoring western larch and ponderosa pine. Clumps of existing snags could be maintained where they exist to offset areas without sufficient snags. Coarse woody debris retention would emphasize retention of downed logs of 15-inch diameter or larger.
- Contractors and purchasers conducting contract operations will be prohibited from carrying firearms while on duty.
- Food, garbage, and other attractants will be stored in a bear-resistant manner.
- Retention of patches of advanced regeneration of shade-tolerant trees, such as sub-alpine-fir, in units in lynx habitats would break-up sight distances, provide horizontal cover, and provide forest structural attributes preferred by snowshoe hares and lynx.
- Provide connectivity for fisher, Canada lynx, and a host of other species by maintaining corridors of unharvested and/or lighter harvested areas along riparian areas, ridge tops, and saddles.

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ATTACHMENT E
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